**Mekelle University**

**College of Business and Economics**

**Department of Cooperative Studies**

# Analysis of the Performance of Local Hybrid Maize Seed Production and Marketing

**In**

**Marwoled and Goshyie, Womberma and Yilmandensa woreda, Amhara, Ethiopia**

**By: Solomon Abie**

**A Thesis**

**Submitted in Partial Fulfillment of the Requirements for the Master of Arts degree**

**In**

**Cooperative Marketing**

**Advisor: Dr.Fetien Abay**

**June, 2011**

**Mekelle, Ethiopia**

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**DECLARATION**

**MEKELLE University**

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Department of Cooperative Studies

This is to certify that this thesis entitled "**Analysis of the Performance of local hybrid Maize seed Production and Marketing in Marwoled and Goshyie, Womberma and Yilmanadensa Woreda, Amhara Region, Ethiopia"** submitted in partial fulfillment of the requirements for the award of the degree of Master of Arts in Cooperative Marketing to the College of Business and Economics, Mekelle University, through the Department of Cooperative studies, done by **Ato Solomon Abie** (**Id.No. PR008/02**) is an authentic work carried out by him under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Name of the student: - **Ato Solomon Abie Yimer**,

Signature _____ date__17 June 2011

Name of the Advisor: - **Dr.Fetien Abay**

Signature _____ date__20 June 2011 _

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## Acronyms

| | |
|---|---|
| ACPA | Amhara Cooperative Promotion Agency |
| ACSI | Amhara Credit and Saving Institute |
| ADLI | Agricultural Development Led Industrialization |
| AISCO | Agricultural Input Supply Corporation |
| AMD | Agricultural Marketing Directorate |
| ANRS | Amhara National Regional State |
| ARARI | Amhara Regional Agricultural Research Institute |
| ASE | Amhara Seed Enterprise |
| BOARD | Amhara Bureau of Agriculture and Rural Development |
| BOFED | Amhara Bureau of Finance and Economic Development |
| CSA | Central Statistical Agency |
| EIAR | Ethiopian Institute of Agricultural Research |
| ESE | Ethiopia Seed Enterprise |
| FAO | Food and Agriculture Organisation of the UN |
| FBSMS | Farmers-Based Seed Multiplication Schemes |
| GDP | Gross Domestic Product |
| GMMP | Producer's Gross Marketing Margin |
| ha | hectare |
| LSB | Local Seed Business |
| MOARD | Ministry of Agriculture and Rural Development |
| MVs | Modern varieties |
| NGOs | Non-Governmental Organizations |
| NMM | Net Marketing Margin |
| NSIA | National Seed Industry Agency |
| OARI | Organization of Agricultural Research Institute |
| OPV | Open Pollinated Varieties |
| OSE | Oromiya Seed Enterprise |
| PMGs | Producer Marketing Groups |
| QDS | Quality Declared Seeds |
| qt | Quintal |

| | |
|---|---|
| RARIs | Regional Agricultural Research Institutes |
| SARI | South Agricultural Research Institute |
| SPC | Seed producers' Cooperative |
| SSA | Sub-Saharan Africa |
| TGMM | Total Gross Marketing Margin |
| WBG | World Bank Groups |
| WFP | World Food Program |
| WGZAD | West Gojjam Zone Agricultural Department |
| WGZOCP | West Gojjam Zone Office of Cooperative Promotion |
| WOA | Woreda Office of Agriculture |
| WWOA | Womberma Woreda Office of Agriculture |
| WWOFED | Womberma woreda Office of Finance and Economic Development |
| YDWOA | Yilmanadensa Woreda Office of Agriculture |

# ABSTRACT

*Production and marketing of hybrid maize seed is constrained by different production and marketing factors in the study area. To analyze those factors, this study was carried in local hybrid maize seed production and marketing in Marwoled and Goshyie seed Producers. Multi-stage sampling techniques were used to select the study area considering their participation in hybrid seed production and marketing. The total sample consisted of 140 members selected randomly. Descriptive statistics and multiple linear regression models were employed to analyze the performance of production and marketing of local hybrid maize seed and also it was measured using indicators of marketing margins and concentration ratio. In addition, the level of perception of the seed producers towards the existing contract local hybrid maize seed production and marketing agreement was identified. The quantity production and supply of local hybrid maize seed was significantly and positively influenced by amount of UREA fertilizer, access to credit, Experience in contract hybrid maize seed production and Time of seed supply. Seed processing, transportation and warehouse cost were identified as the major cost components of local hybrid maize seed marketing which accounted 52.20% of the total seed marketing cost. The gross margin analysis proved that local hybrid maize seed producer shares Producer's Gross Marketing Margin (GMMP)and Net Marketing Margin(NMM) of 52.12% and 65.76% of the consumers' price, respectively. The result of concentration ratio reveal BH660 hybrid maize seed marketing was inefficient at regional level. In 2010, maize seed production and marketing was profitable with per hectare returns of birr 28344.29 over total cost of birr 9884.02. The sample hybrid maize seed producer farmers gain 79.98% higher income than those who grew grain maize for open market. Based on this finding 95 and 79.29percent of the sample households perceived positively that the existing contract hybrid maize seed production and marketing arrangement increases the producers return and level of fertilizer utilization. On the other hand the respondents disagreed with existing price of their produce, time of payment, time of seed supply. Low selling price of locally produced hybrid maize seed, lack of training, lack of fund and poor coordination and communication within seed production and marketing participants identified as constraints. Increasing farmers' technical experience, access of long rainy season and Existence of sustained demand of quality hybrid maize seed identified as opportunities. Poor seed quality inspection system and uniform seed pricing strategy for different grades of local hybrid maize seed identified as major threat for community-based hybrid maize seed production and marketing. To mitigate the existing local hybrid maize seed production and marketing constraints responsible organizations should give attention to provide technical support for Seed producers and traders to exploit properly the existing socio-economic, institutional and environmental opportunities and potentials and encourage Seed producers' cooperatives to play their role at local, regional and National seed marketing.*



**Key words**: Hybrid maize Seed system, Determinants of quantity production and supply.

# Chapter I: Introduction

## 1.1 Background

Ethiopia is a predominantly agricultural economy, the agricultural sector providing about 52% of the GDP and 85% of employment to the rural force, generates 90% of the foreign exchange earnings, and it is a major source of raw materials for domestic industries (MOARD, 2008). The sector is largely characterized by subsistence farming.

Of the various agricultural products, maize is an important food crop in Ethiopia, accounting for 15.39 % of the total harvested area of annual grain crops and 19.18% of cereals (CSA, 2010). The trend in production was largely influenced by unavailability of improved, high yielding maize varieties at the farm level and inefficient marketing system of improved verities of maize seed.

To assure food security and reduce poverty increasing agricultural productivity using modern agricultural input plays a vital role. Among the important agricultural inputs, seed takes the first place. To improve the use of improved seed, ensuring the supply of standard quality at the required quantity, at the right time and at affordable price is decisive. Accordingly, the Government of Ethiopia gives high priority to increase the agricultural production and productivity in order to ensure food security, improve the livelihoods of the society and promote agricultural transformation, industrial development and growth. A well functioning seed production and marketing system, providing the farmers with improved seeds of varieties of their choice is of paramount importance.

The seed system in Ethiopia represents the entire complex organization, individual and institutions associated with the development, multiplication, processing, storage, distribution and marketing of seed in any country. The seed system includes informal seed system and the formal or commercial seed systems. Legal institutions such as variety release procedures, intellectual property rights, certification programs, seed standards, contract laws, and law enforcement are also an important component of the seed system. They help determine the quantity, quality, and cost of seeds passing through the seed system (Maredia, *et al.,* 1999).

The ineffectiveness of the formal seed system greatly reduces the impact of public funded plant breeding program. This failure of seed multiplication and distribution translated into negative rate of return to research investment (Tripp, 2001). A core goal of the government of Ethiopia,

Agricultural Development Lead Industrialization(ADLI) strategy was to raise cereal yields through a centralized and aggressive extension based on technological packages that combined credit, fertilizer, improved seeds and other better management practices (Byerlee, et al., 2007). Nevertheless, though there are undergoing efforts there is a wide gap between improved seed production and demand. Currently the share of the formal seed system in Ethiopia is estimated to be about 10-20% while the rest (80-90%) is covered by the informal system Zewdie B., Yonas S. and Belay S.,2008(Eds.) and in Amhara region, about 87.83% of cereals seed and 66% of maize seed respectively is supplied through informal seed system. (ABOARD, 2010)

Maize is an important food and cash crop in Amhara Region; in 2010 production season, maize production comprises about 56.28% of participants from the total grain producers and 56.80% of cereal producers. In addition, it accounts 8.90 % of the total harvested area of annual grain crops and 12.04 % of annual cereal crops, respectively. And 14.03% of total harvested annual grain production and 17.30% of cereals. Maize production and marketing highly influenced by unavailability of improved, high yielding maize varieties and inefficient marketing system of improved verities of maize seed.

In order to address the problem, Ethiopian Seed Enterprise (ESE) - Bahir Dar branch took the initiative of contractual hybrid maize seed production agreement with Marwoled and Goshyie Seed producer farmers since 2008 with financial support of Local Seed Business (LSB) project.

The establishment of Local Seed Businesses is found to be an effective pathway to strengthen the link between the informal and formal seed systems and thereby contribute to seed security, enhance food security and promote rural economic development in Amhara Region. The project is considered vital in enforcing seed supply and promoting the entrepreneurship of farmers' communities. The existing local level group formation and farmers organizations are important to encourage collective efforts targeting at availability of locally adapted varieties. LSB builds upon the basis of farmer based seed production and PVS and enforces the farmer organizations, strengthens their commercial orientation and autonomy, promoting economic development within the limitations provided by the production environment.

In the mid of 2010 contract hybrid maize Seed producer farmers organize themselves in hybrid maize seed producer's cooperatives (SPC) to produce and supply hybrid maize seed to Amhara Seed Enterprise (ASE) based on the quality and price agreement. This has the advantages that cooperatives offer, economies of scale to members in terms of better price, lower marketing costs

and increase bargaining power, since; it is not possible for the individual farmer to influence the market behavior. The cooperative also provide marketing information to gain advantage of availability, accessibility, time and cost of products and services to the members.

With growing demand of hybrid maize seed have assumed greater importance in the study area. Seed Producers cooperative members produce 3680qt of hybrid maize seed ($BH_{660}$ variety) in 2010. For the success of this farmers based seed production, various partners have been involved in the regional seed system including Amhara Bureau of Agriculture (ABOA, Amhara Seed Enterprise (ASE), Amhara Regional Agricultural Research Institute (ARARI), BahirDar University (BU) and Amhara Cooperative Promotion Agency (ACoPAGEN). Those organizations support hybrid maize seed producer farmers in availing basic seed and technical support. Based on this experience, this study would have a major contribution in local hybrid maize seed production and marketing to overcome the identified constraints and limiting factors that affect the performance of local hybrid maize seed production and marketing in the study area.

## 1.2 Statement of the Problem

In any agricultural dominated economy, Seed production and marketing are the main driving forces to increase agricultural productivity and production.

Agricultural marketing acts as an agent of rural development. Moreover, agricultural marketing will play a coordinating role, steering supply and demand with respect to place, time and possession utilities. A properly functioning market for agricultural products generally perceived as the best organizational structure to achieve efficient production, in terms of type, quantity, quality and time (Bradhan, 1990).

A fully functional seed supply system through which improved variety seeds are to make available to farmers is crucial for sustained agricultural production. The supply of hybrid maize seed and other improved seeds is failing to meet the increasing demand of farmers due to insufficient supply and inefficient marketing system.

Farmers in Ethiopia, in general and in the study area, in particular; affected by insufficient and inefficient supply of hybrid maize seed. Various factors can give rise to insufficiencies and inefficiencies to hybrid maize seed supply system. These factors may originate from poor performance of the formal seed system, lack of coordination among Seed producers, Seed traders, seed users and partners. Limited supply of farm inputs (Seed), lack of investment

capital, high production and marketing cost of hybrid maize seed at producers' level, lack of integration of farmers to the marketing system, weak extension services that ignored marketing development and lack of market facilities are some of the problems exist in local hybrid maize seed production and marketing in the study area.

In general, there are problems in hybrid maize seed supply systems, which hinder the smooth production and marketing of hybrid maize seed from basic seed suppliers, seed producers and seed distributors to the farmers. Therefore, efforts made to improve the quantity supply of quality hybrid maize seed on the right time and at reasonable price.

## 1.3 OBJECTIVE

The performance of hybrid maize seed production and marketing is determined by different factors, so the general objective of this study is to analyze the constraints, and opportunities of hybrid maize seed production and marketing in the study area. The specific objectives are:

1. To analyze the determinant factors those influence the quantity production and supply of hybrid maize seed in the study area.
2. To quantify the marketing margin share of hybrid maize seed production and marketing participants from the final price paid by the consumers in the study area
3. To study the perception of hybrid maize seed producers and customers towards the existing contractual hybrid maize seed production and marketing arrangement in the study area.

## 1.4 Research questions

1. What are the factors that determine the quantity production and supply of hybrid maize seed in the study area?
2. Who is getting the highest share of hybrid maize seed marketing margin?
3. What is the perception of producers and customers towards the existing contract hybrid maize seed production and marketing arrangement?
4. What are the constraints and opportunities in the existing local hybrid maize seed production and marketing to optimize hybrid maize seed business?

## 1.5 Hypothesis

1. There is no relationship between demographic, socio-economic factors and the quantity production supply of hybrid maize seed

2. There is no significant marketing margin difference among hybrid maize seed marketing participants

3. Producer's and customers have positive perception towards the existing contract hybrid maize seed production, and marketing arrangement.

## 1.6 Significance of the study

This study covers community-based hybrid maize seed production and marketing in Marwoled and Goshyie areas, and analysis of the performance of hybrid maize seed production and marketing through evaluation of the production and marketing activities along the different marketing channels of the seed, which include a major input to formulate appropriate hybrid maize seed supply policies and procedures. This information could also help to make appropriate decisions by hybrid maize seed producer farmers, seed traders, seed users, investors and others, who need the information for their respective purposes. Besides, the research will serve as a useful reference for researchers and other personnel interested in the area of study.

## 1.7 Scope of the study

Due to limited distribution of Seed Producers Cooperative (SPC) members-based Hybrid Maize Seed Production and marketing in the region, collection of data was conducted using samples from Marwoled and Goshyie Seed producer cooperative members, Amhara region only.

## 1.8 Organization of the Thesis

This thesis is organized in to five main chapters. The first chapter, focused mainly on the background, statements of the problem, objectives, research questions, hypothesis, significance and scope of the study. Chapter two treat relevant literatures related to the study are reviewed, Chapter three deals with the description of the study area, definition of variables, methods of data collection and analytical techniques. In chapter four, the results obtained from the descriptive statistics and econometric models are discussed. Finally, chapter five contains the conclusions and recommendations of the study.

# Chapter II: Literature Review

In this part the basic concepts of seed, seed system, performance of the market, seed marketing, seed marketing channels, contract farming, farmers perception towards contract hybrid maize seed production and marketing, Local hybrid maize seed partners and their role in the study area have been discussed

## 2.1 Definition of Concepts and the Theoretical Framework

### 2.1.1 Concepts of Seed

Seed is an essential, strategic, and relatively inexpensive input to agriculture with a high rate of return on investment that often sets the upper limit for crop production and the access to seed by farmers is a basic human right simply because seed is life. (Augustine L., 2005).

Seed is the most important agricultural input; it is the basic unit for distribution and maintenance of plant population. It carries the genetic potential of the crop plant. It thus dictates the ultimate productivity of other input such as fertilizer, pesticide; irrigation water etc., Seed and other planting materials are the farmers' most precious resources, especially for smallholders in Sub-Saharan Africa (SSA), where agriculture is characterized by much risk and uncertainty (WBG, 1999).

Seed is generally considered to be the most affordable external input for farmers, and many of its benefits are assumed to be 'scale-neutral'. Therefore, investments in crop improvement potentially can reach a wide range of farmers. While many other areas are also important for agricultural development – such as marketing, credit supply, support institutions, and policies – access to appropriate seed is clearly the first step (McGuire, 2005). Seed of improved varieties and other inputs (fertilizer and crop protection products) are crucial to the transformation of the agricultural sector from subsistence farming to Small-scale commercial agriculture.

### 2.1.2 Seed production

Seed production follows the same technical process as grain production, the difference being that in the case of seed production the process must be more rigorous and closely monitored. Crop inspection and seed testing must be performed at various levels to preserve the seed's genetic purity and germination capacity (FAO, 1999).

### 2.1.3 Seed system

The term seed system represents the entire complex organization, individual and institutions associated with the development, multiplication, processing, storage, distribution and marketing of seed in any country. The seed system includes informal seed system and the formal or commercial seed systems. Legal institutions such as variety release procedures, intellectual property rights, certification programs, seed standards, contract laws, and law enforcement are also an important component of the seed system. They help determine the quantity, quality, and cost of seeds passing through the seed system (Maredia, *et al.,* 1999). Rules and regulations such as variety release procedures, intellectual property rights, certification programs, seed standards, and contract laws influence the structure, coordination and performance of the seed system (Maredia, M., H., and D., 1999).

The seed system must meet consumer needs in terms of the range of plant materials available, the quantities and quality of seed required, and at an affordable price. It must be responsive to changes in demand (quantity, quality and price of seed) through market forces and through the development and orderly release of new and improved cultivars. It must also be economically viable over the long term without having to rely on substantial financial support from government.

### 2.1.4 Formal seed system

According to FAO (1999), formal seed system as a sector comprises all seed program components, namely; plant breeding, seed production, processing, marketing, extension, quality control and certification, which interact among themselves and usually regulated by law. Its principal goal to diffuse quality seed of improved varieties developed by formal breeding programs

A clear chain of activities can characterize the formal seed system. It usually starts with plant breeding and promotes materials for formal variety release and maintenance. Regulations exist in this system to maintain variety identity and purity as well as to guarantee physical, physiological and sanitary quality (Louwaars *et al*., 1999). Seed marketing takes place through officially recognized seed outlets, and by way of national agricultural research systems.

### 2.1.5 Informal seed system

The informal seed sector consists both of individual farmers retaining seed from the previous harvest and farmer-to-farmer seed exchange based on cash, barter, social obligations, etc., by which farmers fulfill their seed requirements. This sector often accounts for the majority of seed sector activity in most developing countries and involves well-established and elaborate mechanisms for the diffusion of seed over relatively wide areas (Cromwell, 1992).

This system has a number of advantages for farmers over formal seed exchange. It uses indigenous structures for information flow and exchange of goods, and its informal nature makes it less rigid than the formal sector. Furthermore, it operates at the community level between households within a small number of communities, so farmers have easy access to seed and often know the farmer from whom they obtain the seed. This is especially important for households that have limited resources to purchase seed. And farmers are able to acquire seed in the quantities they want (Cromwell, 1996).

For small-scale farmers in developing countries, management of seed is of crucial importance and forms an integral part of their crop production systems GTZ, (2000). For many centuries, farmers have developed and maintained their own plant genetic resources, based on local means of seed production, selection and exchange.

### 2.1.6 The nature of Ethiopian agriculture and seed systems

The dominance of subsistence an Ethiopian agriculture, cereals play and crop-livestock mixed farming system of Ethiopian agriculture, cereals play a dominant role. According to the central statistics Agency of Ethiopia CSA (2010) estimated, 11.86 million small holder farmers of Ethiopia are engaged in production of cereal crops in 2009/10 production season and cereals covered 80.26 percent(9.23 million hectares) of the total grain crop area and produce 155.34 million quintals of cereal crops. In the same production season, 3.49 million smallholder farmers of Amhara Region participated in cereal crop production within 2.49million hectares and produce 46.30million quintals of cereal crops that accounted 81.09 percent of the total grain produced. Among cereal crops, teff, maize, wheat, barley and sorghum are important crops in Ethiopia as well as in Amhara Region.

The informal seed system under Ethiopian context is defined as seed production and distribution along with the different actors where the there is no legal certification in the process. This

includes retained seed by farmers, farmers-to-farmers seed exchange, cooperative based seed multiplication and distribution, NGO based seed multiplication etc. The formal seed system on the other hand is a system that involves the production and distribution of basic seeds. Mainly by the research system or certified multipliers (like ESE, the regional seed enterprises and also recently licensed private seed companies like Agri-Ceft Ethiopia and the production and distribution of certified seed along with all actors involved in the production, marketing and regulation (Dawit, 2010).

Over all, the dominant portion of seed used is local seeds from the informal sector. During the 2008 main meher growing season it is estimated that at least 95 percent of all seeds used were local seeds carried over from the previous harvest either by the farmers themselves through the traditional on-farm selection process. Whereby the farmer identifies next year's seed stock while it is still maturing in the field and gives it special protection or by buying from preferred seed stock kept by other farmers in the same locality (FAO, 2009 and WFP, 2009).

### 2.1.7 Seed Development, Production and Distribution in Ethiopia

In Ethiopia, national seed policy promotes both formal and informal seed production. In the formal sector, both public and private companies are encouraged to produce and supply seed. In the latter, farmers are encouraged to participate in local level seed production and marketing within their communities. The Ethiopian seed industry is composed of formal and informal sectors as well as public and private organization. The formal sectors include federal and regional agricultural research institutes, universities, the regulatory organ in the MoARD, and private companies. The informal sectors encompass millions of farmers, who continue to practice seed selection and preservation, just as their ancestors did (Abdisa *et al*., 2001).

### 2.1.8 The performance of formal seed system in Ethiopia

Ethiopia is known for its agro-ecological and biological diversity. Ethiopian farmers have a long tradition of settled agriculture contributing to the evolution and maintenance of the country's rich agro biodiversity, and to a well entrenched informal seed system. Farmers use centuries-old strategies, including the improvement of farmer-saved seeds, farmer-to-farmer seed exchange, and farmer-managed seed production. The seed production-distribution chain in the informal seed system is short and simple, without any regulation Zewdie B.,Yonas S., and Belay

S.,2008(Eds.) Although the formal seed sector started some five decades ago, it still remains limited to a few major crop varieties developed by agricultural research. Currently the share of the formal seed system in Ethiopia is estimated to be about 10-20% while the rest (80-90%) is covered by the informal system Zewdie B.,Yonas S.,and Belay S.,2008(Eds.) . Therefore, the informal seed sector remains the major supplier of seed of improved and local varieties for many crops grown by small-scale farmers.

Some attempts have been made to improve seed supply by working with farmers through contractual seed production with Farmers' Producers Cooperatives and through farmer-based seed production and marketing units. Improving farmer based seed production schemes and revitalizing informal seed supply for local crops and varieties is crucial for the development of the seed sector in the country. Supporting the informal seed sector will help to maintain genetic resources and to increase productivity to attain food security and improve farmers' livelihoods. Table1 depicts the supply of improved seeds for cereal crops and Maize seed in 2009/10 was 5.17% and 19.75%, respectively. During the same production season, the supply of improved cereal seeds and Maize seed in Amhara Region was 5.83% and 35.23%, respectively.

Table1. Area planted with improved seeds in Ethiopia and in Amhara Region (2009/10)

**Cereal crops**

| Crops | Total area (000 ha) | Area covered with improved seed | |
|---|---|---|---|
| | | Area (000 ha) | % |
| Teff | 2,481 (1000) | 16.61 (4.79) | 0.67 (0.48) |
| Barley | 978 (347.7) | 6.04 (3.15) | 0.62 (0.91) |
| Wheat | 1,454 (434.4) | 56.03 (10.62) | 3.85 (2.44) |
| Maize | 1,768 (396.7) | 349.22 (139.76) | 19.75 (35.23) |
| Sorghum | 1,615 (547.1) | 1.48 (0.70) | 0.09 (0.13) |
| **Total** | **8296 (2726)** | **429.38 (159.02)** | **5.17 (5.83)** |

NB. Figure in parenthesis shows area planted with improved seeds in Amhara Region.

Source: CSA, 2010.

## 2.2 Maize

Maize or corn a common name of *zea mays* it is a tall stalk grass, originated in central and South America and was the staple grain of the region for many countries.

Maize introduced in West Africa in 15 century in East Africa and Ethiopia between 16 – 17 century .Maize in Ethiopia is mainly produced for food consumption and for cash.

Under Ethiopian context, seed politics is dominated by maize, especially hybrid maize. Policy-makers consider maize as a crop where huge productivity gains can be obtained to boost domestic production. Also, due to the fact that it cannot be recycled, there is huge demand by farmers, and all public and private seed companies are engaged in its multiplication creating competition among these actors. The seed for OPV maize is produced by the Ethiopian Seed Enterprise (ESE) only in limited volume whereas the seed for hybrid maize is produced by both the public and private sector.

The area allocated and the productivity level of maize has been increasing since 1994. The area allocated in 1994 was about one million ha, which has increased to about 1.8 million ha, of land in 2008. Similarly, the average national productivity of maize has increased from 15qt/ha in 1994 to about 22qt/ha in 2008/09 mainly due to the strong public push of improved seed and fertilizer (CSA 1994; 2009. as cited in Dawit, 2010). Policy makers believed this average can be increased to 80qt/ha if improved hybrid maize hybrid varieties along with the recommended agronomic practices are applied (Dawit, 2010). In the major maize producing areas (East and West Wollega and East and West Gojjam), the average productivity levels under farmers' condition ranges from 60 to 90 quintals/ha due to better use of hybrid maize varieties and associated inputs(MOARD, 2009).

### 2.2.1 Hybrid maize seed Production and Distribution in Ethiopia

Basic seed for cereals are produced by respective research centers of EIAR and RARIs, the ESE, OSE and ASE, and by the licensed private seed companies. Bako Agricultural research center of Organization of Agricultural Research Institute (OARI) was the only producer of basic seed for hybrid Maize that were developed by the National Research system and the pre-basic was supplied by National Maize Project at Bako of EIAR. However, starting from the 2008/09 production season, Adet Agricultural Research Center of Amhara Regional Agricultural Research Institute (ARARI) and Hawssa Agricultural Research Center of the south Agricultural Research Institute (SARI) from the public sector and Agri-Ceft Ethiopia from the private sector are licensed for basic seed production of most of the popular public hybrid maize varieties. Of

course, Pioneer Hi-bred Ethiopia, which is a multinational seed company, has its own hybrid maize varieties that are evaluated and released through the formal procedure in Ethiopia (Dawit, 2010).

### 2.2.2 Hybrid Maize Seed Producers

Hybrid Maize Seed producers are both public and private. Ethiopian Seed Enterprise (ESE) dominates the public seed production and since 2008 regional seed enterprises (RSES) have come in to the picture, at present there are two RSES, Oromiya Seed Enterprise (OSE) and Amhara Seed Enterprise (ASE). Companies mainly involved about 30 licensed private seed in the production of hybrid maize seed. The role of cooperatives in seed multiplication is increasing from time to time. They are already engaged in seed production, cleaning and trading of Quality Declared $s_2$ (QDS) of OPV varieties with technical support from woreda office of agriculture. However, the supply of basic seed of adapted improved crop varieties is in shortage for such program.

The ESE produces certified seed through contract arrangement on state and private commercial farms, on farmers' fields along with the production on own farms. Similar approach is followed by the newly established regional seed enterprises. It is expected that the emergence of regional seed enterprises will promote the production of seed for crops that are not so far produced through the formal system. An additional alternative in increasing the seed production capacity, the public seed enterprises are promoting farmers-based seed production and marketing schemes and considerable achievements have been made. For instance, the Amhara Seed Enterprise (ASE) has promoted Farmers' Based Seed Multiplication Scheme (FBSMS) immediately after its establishment in early 2009, with a focus on potential areas for seed multiplication and clustering approach including Wombera and Yilmandensa woreda seed producers' cooperative members. The focus on potential areas helps in reducing the cost of production and helps to get quality seed. The clustering helps to ease the management and supervision of the seed production process.

## 2.3 Seed industry structure

Douglas (1980) indicated that the seed supply systems in most countries pass through four evolutionary stages characterized by increasing technological and organizational complexity:

1. Farmers save their own seed from crop to crop by selecting the most productive plants. They also exchange seed with a few farmers.
2. A specialized government agricultural department emerges under pressure from farmers and conducts plant breeding research and varietals development. A few farmers specialize in multiplying and distributing seed released by the government research stations.
3. Private seed companies enter the seed industry and invest in plant breeding research and development, seed growing, processing, and marketing.
4. Plant breeding and seed production and marketing become highly organized and technologically intensive. Both public and private organizations engage in seed production, marketing, and international trade. The Ethiopian seed industry is currently at the second and third stage of development. The National and Regional Agricultural Research Institutes and private seed companies develop improved varieties. Public institutions, private seed companies and cooperatives are responsible for producing, marketing and distributing seed to farmers.

## 2. 4 the role of quality control and certification with respect to farmers multiplied seed

Seed regulation involves a range of activities around deciding which MVs should be released, testing for purity in seed certification, regulating seed marketing, and protecting intellectual property rights aims to ensure the physical and genetic quality of formally supplied seed, and to build farmers' confidence in such seed, through certification tags or other means (McGuire, 2005). If local-level seed production were to expand significantly then some formal system of quality control would be needed (Tripp, 2001).

Seed certification is the "official" seal declaring that the "certified" seed has been grown from a proven, tested and recognized genetic source, and that it has the stipulated germination percentage, purity, health and moisture content. Quality control checks adulteration of seed by seed marketers and should be enforced regardless of whether certification is mandatory or not (WBG, 1999).

Seed certification follows a kind of chain-control system; every generation of seed has its own procedures and standards, which are monitored through checks, documents and seed production fields. Standards include, for instance, the distance to neighboring fields with the same crop or to weeds that may cross with the seed crop, the number of allowable off types, and so on.

Certification also involves strict procedures for labeling and sealing seed packs. Seed certification thus requires a very organized formal system, and is normally reserved for well described and stable varieties (Louwaars *et al*., 1999).

## 2.5 Seed Regulation

Seed is a commodity that requires special care, because its characteristics – viability, germination, purity, and sometimes even the identity of the variety are difficult to assess at the time of sale. Because these characteristics may not be apparent until after planting, or even until harvest, some type of regulatory system is required. Regulation is often thought to be the responsibility of government, but in fact there are various alternatives (Tripp, 1997). Any strategy must take account of the three participants in the regulatory process – government/regulators/, consumers, and producers.

## 2.6 Seed Marketing

Marketing is defined as the process of anticipating the needs of targeted customers and finding ways to meet those needs profitably ( Pichop,G.N.S. Madiga.,2007). The key ideas are:

**Anticipation**: good marketers are always working to anticipate what their customer needs will be in the future.

**The Target market**: is the group of potential customers to whom the company has chosen to market its products. “The one size fits all” is not always good approach for marketing seed and agricultural products. Good marketers will understand this and focus their efforts on the unique needs of specific target customers or market segments.

Marketing is also the performance of all business activities involved in facilitating the flow of goods and services from the point of initial production until they are in the hands of the final consumer ( Kotler, 2003).

### 2.6.1 Nature of seed marketing

Seed Marketing is one of the most vital components of seed technology; it aims to satisfy the farmer's demand for reliable supply of a range of improved seed varieties of adequate, assured quality at an acceptable price at accessible location. It includes such activities as production, processing, storage, quality control and marketing of seeds (FAO, 1994).

Seed marketing is the most important as well as a challenging aspect of seed industry because of the nature of the product. Seed being a living organism, its quality deteriorate faster. Thus, its shelf life is limited and it must be marketed within the season (Singh, 2004).

Seed marketing is the means of bridging the gap between production and consumption (McCarthy and Perrault, 1990). In the seed industry, a number of gaps exist between the business and the customers, such as spatial gap, Time gap, Information gap, Value gap.

The nature of seed demanded by farmers differs. Large- and medium-scale farmers use markets to purchase uniform genetic materials that are highly responsive to chemical inputs and embody specific characteristics (e.g., color, uniformity of grain size) rewarded by the market. By contrast, more subsistence-oriented smallholders may value characteristics such as drought tolerance, early maturity or good storage more than fertilizer responsiveness. Because of the small size of their land holdings, mixed cropping practices, and strategy of minimizing production risks by diversifying the variety base, smallholders also demand relatively small quantities of seed but for a number of varieties of the same crop and recycle seed over more seasons than larger commercial farmers (Maredia *et al*., 1999).

Seed demand from different users can be met by promoting a range of seed organizations with comparative cost advantages in supplying seeds of distinct commodities to different groups. For example, multinational seed companies can meet the seed needs of large-scale commercial farmers whose quality requirements and willingness to pay are higher than smallholder farmers are. Small-scale firms' or Community-based Seed Multiplication and Distribution Schemes can meet the seed needs of the latter group more effectively. Such as farmer's seed groups and seed producers' Cooperatives (Maredia *et al*., 1999). The largest problem faced by seed multiplication program elsewhere in Africa is difficulty of building a sustainable seed market. Small quantities of seed are being profitable sold within the village community (Rohrbach, 1997).To increase the sales of seed produced by farmers, promotion activities should be conducted to raise awareness of all farmers in villages under smallholder seed production programs (Kibiby *et al*., 2001). Promotional activities should focus on the advantage of improved seed and the quality of seed produced in their own villages by small holder seed producers. A primary objective of these promotional activities would be to increase the willingness of farmers to purchase seed from small producer.

The study made by Abdisa *et al.* (2001) stressed on that, if the farmers could not find sustainable and dependable market for his improved seed produced they never engage in the activities perhaps obliged to restrain from the activities. Thus would lead farmers to be suspicious and reluctant to adopt any technology offered to them .Hence market information; on where and when to sale is quit essential, if informal seed production to be sustainable.

One of important factors that influence farmers' seed multiplication is the performance of the existing market channel. The choice of the marketing channel depends on the availability of markets, prices offered in the market, distance to the market and the potential of the market to absorb the stock on sale (Montshwe, 2006).

### 2.6.2 Performance of the market

Market performance refers to the economic result of market structure and conduct. The indicators of market performance include (1) product suitability in relation to product quality, (2) rates of profit in relation to the margins at the different trading levels, (3) level of output in relation to any deliberate restrictions to influence prices, and (4) price integration between markets and the degree of unpredictable variation of prices in markets including accuracy and adequacy of information flows throughout the marketing system (Dijkstra 1997).

Performance of the market is reflection of the impact of structure and conduct on product price, costs and the volume and quality of output (Cramers and Jensen, 1982). If the market structure in an industry resembles monopoly rather than pure competition, then one expects poor market performance.

According to Abbott and Makeham (1981), market performance is how successfully the firm's aims are accomplished, which shows the assessment of how well the process of marketing is carried out. Is produce assembled and delivered on time and without wastage? Is it well packed and presented attractively? Is its quality reliable and are terms of contract observed? Is the consumption of the products increasing and sales in competitive market expanding? There are such practical indicators of how well a certain marketing system is operating. As a method for analysis the SCP paradigm postulates that the relationship exists between the three levels distinguished. One can imagine a causal relations starting from the structure, which determine the conduct, which together determine the performance (technological progressiveness, growth

orientation of marketing firms, efficiency of resource use, and product improvement and maximum market services at the least possible cost) of agricultural marketing system in developing countries (Meijer, 1994).

### 2.6.3 Structure of the market

Market structure includes those characteristics of the organization of the market that seems to influence strategically the nature of competition and pricing within the market(Bain,1986).Market structure of the maize seed industry has some main elements, namely: (1) degree of buyer and seller concentration.(2)degree of product differentiation. (3) Barrier to entry and (4) market Knowledge. Market structure determines the behavior of a firm in the industry while market behavior, in turn, affects the industry's performance (Bambang, 2006).

The degree of concentration refers to the ownership or control of a large proportion of some aggregate of economic resources or activity either by small proportion of the units which own or control the aggregate, or by small absolute number of such units. In this study, the interest is in the concentration of the control of the volume of improved maize seed production and sales at the seed companies/producers' (both government owned and private) level and in the concentration of the control of the volume of maize seed sales at the seed distributors' level.

Concentration implies the degree of market power (Suvanichwong, 1997).Market power is ability of a firm to influence perceptibly the price and quantity in the market.

The degree of product differentiation refers to the buyers differentiate, distinguish or have specific preferences among the competing out puts of the various sellers established in an industry (Suvanichwong, 1997).

Market knowledge refers to the seed companies' and distributors' market information includes the types and verities of maize seeds preferred by farmers, potential seed requirement by region, and the prevailing market price.

### 2.6.4 Conduct of the market

The structure and the conduct of market participants have a direct implication for the nature of production price relationships between different marketing levels and the direction of causality. Market conduct refers to the practices or strategies of traders in maximizing their profits.

Among these practices are the use of regular partners, long-term relations with clients, and suppliers, the use of intermediaries, and trade within personalized networks (Wolday, 1994).

Market conduct deals with the behavior of firms that are price-searchers are expected to act differently than those in a price-taker type of industry (Cramers and Jensen, 1982). Price21 searchers can determine their selling prices or quantity of output they sell. In addition, they could use their market power to weaken or eliminate competitors example reducing price. According to Abbott and Makeham (1981), conduct refers to the market behavior of all firms. In what way do they compete? Are they looking for new techniques and do they apply them as practicable? Are they looking for new investment opportunities, or are they disinvesting and transferring funds elsewhere?

According to Bain (1968), market conduct refers to the patterns of behavior firms follow in adopting or adjusting to the markets in which they sell or buy. or in other words, the strategies of the actors operating in the market. Elements of marketing conduct include selling, transport, storage information and finance. As pomery and Trinidad (1995) argued, there are no agreed procedures among researchers for analyzing the elements of marketing conduct. In our case, to analyze the market conduct of local hybrid maize seed we tried to use systematic way to detect indications of unfair price setting practices and conditions under which such practices are likely to prevail.

### 2.6.5 Performance

Market performance refers to the economic results that flow from the industry as an aggregate of firms. in other words, it refers to the composite of end results, which firms in the market arrive at by pursuing whatever lines of conduct, they espouse-end results in the dimension of price, output, production and selling cost, production design and so forth(Bain and Qualls,1968). As Bressler and King (1970) argued, market performance refers to the impact of structure and conduct as measured in terms of variables such as prices and cost components.

### 2.6.6 Methods of evaluating marketing performance

Market performance can be evaluated by analysis of costs and margins of marketing agents in different channels, and market integration. A commonly used measure of system performance is the marketing margin or price spread. Margin or spreads can be useful descriptive statistics if

used to show how the consumer's goods and service price is divided among participants at different levels of the marketing system (Getachew, 2002).

### 2.6.6.1 Marketing Margins

As Mendoza (1995) argued, when there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments and then comparing them with the final price to the consumer. The consumer price is then the base or the common denominator for all marketing margins. Computing the total gross marketing margin (TGMM) is always related to the final price or the price paid by the end consumer and expressed as a percentage.

A marketing margin really measures the shares of the final selling price that is captured by a particular agent in the market chain. It includes costs and some additional net income. For firms acting as a seller, results measure the character of the firm's adjustments to the effective demands for their out puts.

### 2.6.6.2 Marketing Costs and Margins

Results of analysis of marketing costs and margins are used to determined whether there are excess profit and serious inefficiencies or whether wide margins are due to technical constraints(like transportation bottle neck). Like in any agricultural marketing, in Seem marketing, there are several participants in the market chain; the participants include Seed producers, seed processors, Cooperative Unions and primary cooperatives. The relative share of the different market participants will be estimated using the marketing margin analysis. The total marketing margin in the marketing system constitutes the marketing costs plus profit earned by the different participants in the system.

### 2.6.7 Marketing channels

The term channel is derived from the Latin word canalis, which means canal. A marketing channel can be viewed as a large canal or pipe line through which products, their ownership, communication, financing and payment, and accompanying risk flow to the consumer (Backman and Davdson, 1962).

According to Mendoza (1995), marketing channel is the sequence of intermediaries through which whole locally produced hybrid maize seed passes from producer farmers to final consumers/farmers. The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin (producer) to the final destination (ultimate user).

A marketing channel is a business structure of independent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler and Armstong, 2003). Abbot, (1958) define marketing channel as the sequence of intermediaries through which goods pass from producer to consumer. This channel may be short or long depending on kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam et al., 2001).

**Seed distribution before 1991**

ESE ⟶ AISCO ⟶ MOA or NGOs ⟶ Farmer

**Seed distribution after 1991**

ESE ⟶ MOA (Zone) ⟶ MOA (woreda) ⟶ Development Agents (PA) ⟶ Farmer

**Fig$_1$**. Formal seed distribution channels in the study area.

Source: Respective woreda office of Agriculture, 2011

## 2. 7 Seed pricing policy

The long-term viability of small-scale seed provision relies on government intervention in price setting, with the result that official seed prices do not reflect the full cost of production. Another aspect of government intervention is the tying of agricultural subsidies and credit programs to the use of public bred improved seed, which can artificially promote its use but restrict the viability of small-scale seed provision (Tripp, 1997).

## 2. 8 Process of price decision of certified Hybrid Maize Seed

Pricing is one of the most important issues concerning the producers' and the contractor. Prices paid for contracted crops are usually lower than prevailing market prices. As cited by Singh (2004), "most farmers try to sell their produce to market instead of the factories since they get higher prices and are not required to comply with the conditions specified by the factories.

The interaction of different actors in the process of price setting for certified seed. The core decision on seed prices is made by the board of directors of the Ethiopian Seed Enterprise (ESE), which is composed of

the Director General of EIAR as chair, two ESE representatives, Director of Agricultural Extension, Director of the Agricultural Marketing, and Director of the Planning and M&E Directorates of MoARD as members. The set price is then communicated to the Agricultural Marketing Directorate (AMD) of MoARD. The AMD gives a direction on the price setting mechanism and communicates along with the amount appropriated and Purchase price to regional agricultural marketing department of the respective regions. The different cooperative unions purchase the certified seeds at these different prices from both public and private seed companies.

As indicated by Dawit, 2010. The current price setting mechanism has both advantages and disadvantages, the advantages are:

1. It limits the entrance of excess intermediaries in the market, which helps farmers to get seed at reasonably better prices
2. It enables farmers with limited access to markets (those in distant areas with poor road) to purchase seed equitably
3. It promotes group marketing especially through membership in cooperatives.

The disadvantages are:

1. It transfers the cost incurred due to the inefficiency of union and primary cooperatives to farmers,
2. It limits the competitions among the different seed producers,
3. It creates disincentive for seed producers to work and invest on their own distribution systems,
4. It is liable to corruption and promotes black market for seed.
5. It limits the participation of Seed producers in price setting

## 2.9 Contract farming concept

Contract Farming (CF) is an agreement between buyers and producers, where by producers agree to produce and supply agriculture products according to the agreed quantity, quality, variety, grade, type of packaging and time of delivery. The two parties will mutually agree on

the pricing of product, either on a contract price or on a market price (Eaton, C. and A.W. Shepherd, 2001).

The terms of the contract vary and usually specify how much produce the contractor will buy and what price they will pay for it. The contractor frequently provides credit inputs and technical advice. Contracting is fundamentally a way of allocating risk between producer and contractor; the former takes the risk of production and the latter the risk of marketing (Baumann, 2000).

Contract farming is defined as agricultural production carried out according to a prior agreement in which the farmer commits to producing a given product in a given manner and the buyer commits to purchasing it. Often, the buyer provides the farmer with technical assistance, seeds, fertilizer and other inputs on credit and offers a guaranteed price for the output (Minot, 2007).

Roy (1963) defined contract farming as those contractual arrangements between farmers and companies, whether oral or written, specifying one or more conditions of production and/or marketing of an agricultural product. He highlighted various contractual arrangements prevailing in vegetables and fruit processing sector in USA. He observed two types of contracts namely bailment coupled with contract to produce and supply and contract to produce and sell. Further, observed that the processors were supplying the seed material for cultivation at a stated price to be paid by the grower after the harvest. Fertilizer and plant protection provision were not found in such contracts. Researcher also evidenced that the processors provided a variety of services other than technical support. The growers were found to maintain better relationship with the extension worker of the company. The growers had problems with grading of the produce in some areas.

## 2.10 Farmers' perception towards contract farming

As indicated by Sribooncitta et al., (1996) Viability of contract farming depends on the satisfaction of both farmers and firms, and profitability is certainly the key concept. At the initial stage of contract, farmers' perceptions regarding new crops and their attitudes towards contract farming are important. Farmers joined contract farming for a number of reasons:

Market certainty for their produce, price stability, provision of input on credit, expectation of higher income for their produce, lack of alternatives, after observing their neighbors higher income, etc. in addition the survey in 2004, the landless farmers felt that contract farming

provided them good opportunities to raise income while labor was only resource they had. The new crop and new management could restrain farmers from continuing the contracts; evidence from Chiang Mai during the 1990's showed that 35% of the respondents felt the new crops were more complicated, their attitudes were affected by their production background and experiences. Farmers who had experiences in vegetable and horticulture crop production were likely to find production of all the contract crops relatively easy (Wiboonpongse et al., 1998).

## 2.11 Related empirical studies on merits and demerits of contract farming

Contract farming is an institutional arrangement widely adopted in agricultural production (Roy, 1963; Glover and Kusterer, 1990; and Gloverand Ghee, 1992; as cited in ABDI discussion paper 109, Cai, Stboonsamg, and Leung, 2008). Contract farming represents an agreement between farmers and contractors for the production and supply of agricultural products. Under contract farming, farmers usually agree to deliver specific commodities in predetermined quantities and to meet predetermined quality standards, while contractors agree to provide production support (e.g., supply input and provision of technologies) and accept products at predetermined prices(Eaton and Shepherd,2001). Contract farming is beneficial to farmers because it opens up otherwise unavailable markets (Especially to smallholder farmers), providing materials, technological and financial support, and reducing farmers' costs and the risks involved in selling products. It also benefits contractors by allowing them to establish close relationships with farmers and by reducing uncertainties in purchases through predetermined timing, prices, and quality standards (Glover, 1984; Key and Runsten, 1999; singh, 2002; and Setboonsamg, 2008).
Contract farming is the signs of increasing the use of farm contracts are everywhere especially on the production side of agriculture (Harl, 1998). Specialty grains, livestock feed, even fruits and vegetables, are being produced under contract widely (Fulton et al., 2003; Harl, 1998). This is because of the fact that contract farming has the potential to significantly raise the income of growers, and it frequently provides credit, inputs, information, and services that are needed by smallholders to cultivate and market lucrative non-traditional crops (Glover, 1984; Goldsmith, 1985; Williamson and Karen, 1985).
While contract farming is conceptually sound institutional arrangement, Lack of flexibility is one of its main liabilities, and coordination problems are faced during its implementation (Glover and Kusterer, 1990; and little and Watts, 1994).

Eaton and Shephred(2001)summarizes that the potential factors that contribute to the positive impact of contract farming on the rise of the participant's income level are the provision of inputs and production services, easy access to credit, introduction of appropriate technology, skill transfer, guaranteed and fixed pricing structures, and easy access to reliable markets. On the contrary, according to these scholars, increased risk, unsuitable technology and crop incompatibility, manipulation of quotas and quality specifications, corruptions, domination by monopolies, and indebtedness and over reliance on advance are the potential factors that contribute the negative impact of contract farming.

## 2.12 An overview of the Role of Agricultural Cooperatives in Contract Farming

As it is known, markets in rural areas, particularly the agricultural markets suffer especially from problems of market information, inadequate competition, and weak enforcement of contracts(Eleni and Wolday,2003).Like other entrepreneurs, the farmers operating within these markets have continually complained about having to sell cheap as a producer and buy high as a consumer(Kohls and Uhl,1985).

Farmers badly need protection of their rights and benefits in the process of marketing of their produces. This can be achieved by being a member of agricultural cooperative, which would provide them easy access to available markets, enhanced net returns and countervailing power when facing anti-competitive market forces (Kohls and Uhl, 1985).

Cooperatives are special purpose organizations that have unique attributes compared to other forms of enterprise. They are independent, member-owned, and democratically governed business, created with equity financed by members who invest in order to benefit through their patronage (Weihe, 2004).

The major goals that cooperatives strive to achieve are

- Improve bargaining power in purchasing farm supplies and selling farm products
- reduce costs of marketing farm products; obtain products or services which are either costly or not otherwise available
- obtain better marketing access for cooperative members
- Improve product or service quality in both farm inputs purchased or commodities marketed

- Increase farmer's income and provide information and education to increase agricultural production efficiency and enhance quality of life in rural areas (Padberg et al., 1997).

Most of these cooperatives' goals can be achieved whenever the cooperatives market their members' produce through vertical coordination arrangements, especially by participating in contract farming programs with their members. For instance, as the cooperatives have the capacity to cut the excess margins by controlling the flows of farm products to the markets (Cropp et al., 1998).

The analysis made on the Hindustan Lever Company and its northern Indian contracted farmers showed that yields and incomes of farmers from contracted tomatoes production was 64% higher than those who grew tomato for the open market (Shepherd and Eaton, 2001). Furthermore, a study made on the contracted hog producers of Minnesota farmers reported that the advantages like higher market prices that allowed them to be in the hog business, and increased access to capital were more important than disadvantages they faced( e.g., locked out of higher prices)(Rehber,1998).

## 2.13 Partnership in Contract local hybrid maize seed production

Hybrid maize seed production and marketing is a complex process involving several steps: Product development, testing, seed multiplication and marketing. Therefore, the actual multiplication and marketing of hybrid maize seed is a product of both biological and social processes involving the interaction of several factors (Vellema, 2000).

According to the study made on farmers based seed multiplication in Tanzania by Rohrbach *et al* (2002). Strong implementation partnership is essential to ensure both the success and sustainability of the seed projects. The role and responsibility of each implementing partners need to be clear both the partners and to the other involved in the project. Clear responsibilities help to insure consistent implementation of the mandated program, and eventually the sustainability of those efforts.

Improved communication and collaboration between various participants in local hybrid maize seed production and marketing is vital. Amhara Seed Enterprise, Amhara Bureau of agriculture, BahirDar University and Amhara cooperative Agency are currently active in supporting local hybrid maize seed production program, all of which are to some extent directly or indirectly interrelated. Coordinated efforts are essential to facilitate system reforms and no initiative can

achieve this objective by working independently as a program of a single donor or organization (WBG, 1999).

Farmers' seed production can be quite efficient and some producers will have potential to expand as specialized, small or medium-sized seed companies. Seed trader associations, government agri-business promotion programs and especially NGOs have a potential role in promoting improvements in production, marketing, and distribution systems traditional farmers' seed producers. This may involve in training in seed production and handling, establishing linkages to sources of foundation seed, developing marketing skill and approaches, and promoting the transformation in to commercial seed companies. For these interventions to be sustainable, they must be accompanied by appropriate legal changes, training and market development, and elimination of direct subsidies (WBG, 1999).

Recent years have witnessed a proliferation of NGO and research support to local level seed production and dissemination activities. These activities have a wide range of objectives including improved dissemination of modern varieties, preserving genetic diversity and quality, improving seed availability (Time, place, quantity), and reducing the cost of seed and dependence on external sources(David,2003). However, there are different NGO and relief agencies involved in the seed sector, the role played by them in the Ethiopian seed system is difficult to assess because their activities are dispersed and uncoordinated especially in the case of relief interventions.

As indicated by Tripp (2003), seed system development requires support, funding, and many countries may be able to take advantage of donor projects in the seed sector. Unfortunately, much of donor activity to date has not been supportive of sustainable seed sector development.

The study made by Bekele *et al*. (2006) pointed that, among the potential market-supporting institutions can that enhance marketing functions in rural areas are farmers' organizations such as Seed Producer Cooperatives (SPC). Their potential in this process lies in enabling contractual links to input and output markets. They can facilitate collective marketing of agricultural output marketing that will help reduce transaction costs related to the marketing of agricultural inputs and small marketable surplus emanating from a large number of widely dispersed small producer.

### 2.14 Terms of contract agreement in the study area

The contract agreement in the study area was in the form of oral and written which covered the responsibilities and obligations of each party, Agreements were made between Amhara Seed Enterprise (ASE) and each local hybrid maize seed producer farmers.

The technical aspects of the agreement were drafted in short, simple term, clarifying the responsibilities of both farmers and the contractor. Pricing formulae in the financial section was designed to encourage the farmers to produce maximum yields.

### 2.15 The contractor's responsibility includes

1. Supply basic seed to seed producers without any cost to encourage quality seed production and to increase the income of local hybrid maize seed producers from local hybrid maize seed production and marketing arrangement and to eliminate the shortage of hybrid maize seed supply in Amhara Region (Article 3 of the contract agreement ).
2. Receive the whole produced hybrid maize seed with 750birr/qt immediately after thresh (Article 4 of the contract agreement)
3. After checking the quality requirements of the seed and liable to accept the produce (Article
4. Pay for the producer immediately based on the amount of hybrid maize seed received (Article 6 of the contract agreement)
5. The contractor introduce bags and their accessories to the seed producers

### 2.15.1 The Seed producers' responsibility includes

1. The producer should accept and perform the technical support and advice provided by the contractor and produce quality seed(Article 5)
2. Based on the support and advice the seed producer should produce and supply good quality hybrid maize seed.(Article 5)
3. The seed producer should supply 100% of his produce based on pre-determined price to the contractor at the office of Peasant Association immediately after thresh(Article 5)

### 12.15.2 Other included agreements

1. Inputs other than inbred maize line seed supplied by the formal supplying procedure(Article 5)
2. The woreda and Kebele agricultural experts are responsible to provide technical support; to the seed producer farmers about the characteristics of the variety and how to produce hybrid maize seed.

### 2.15.3 Dispute resolution mechanism of the agreement

Disputes should be resolved through negotiation with the mediator of woreda administrator and head woreda agriculture office. If the disputes cannot be resolved with negotiation, as based on the civil code number 1792-1794, the agreement will be failed.

# Chapter III: Materials and Methods

This chapter summarizes description of the study areas, methods of data collection, Sampling techniques, procedures and sample size and it also contains methods of data analysis (descriptive and Econometrics).

## 3.1 Site Selection and Description of the study area

### 3.1.1 Amhara National Regional State

The Amhara National Regional State (ANRS) is found in the northwestern part of Ethiopia. The boundaries of the region adjoin Tigray in the north, Oromia in the south, Afar in the east, Benishangul Gumuz region in the southwest, and Sudan in the northwest. The total area of the region is 157,076.6 square kilometers, which is almost 15% of the country. Out of the total area, 27.3% is under cultivation, 30% is under grazing, forest, bush and herbs cover 14.7% and 18.9% is currently not used for productive purposes. The remaining 9.1% represents settlement sites, swampy areas, and lakes. Based on the traditional agro-ecological zones, the region has three climatic zones, namely, Dega including wurch (25%), Woyina-Dega (44%) and Kola (31%). The region has an average annual rainfall ranging from 500 to 2000 mm and has a mean annual temperature ranging from 7.5 to 27.5 $^{0}$c (BOFED, 2006).

The population of the region was estimated to be 18,192,795 in 2010 and of these, 86.83% live in rural areas (BOFED, 2010). The region is divided into 11 administrative zones, including the capital city of the region, Bahir Dar and organized into 151 woredas (130 rural and 21 urban) and 3232 peasant associations. (BoPED,2008).

The region has 11,757,295 cattle, 9,469746 sheep, 5,468,624 goats, 288,848 horses, 1,804,408 donkeys, 135,564 mules 26,416 camels 12,364,825 hens and 975,752 beehives in (BOFED, 2008). The cropping systems of the region are predominantly rain fed. It has fertile farmland and water resources suitable for crop production and livestock husbandry. The region has 5977 primary cooperatives having 2,338,894 members of which 419, 488, (17.93%) are female members with a combined capital of about Birr 323,600,636.00, and there are 42 secondary cooperatives (cooperatives' unions) having 1289 members and with a combined capital of about Birr 130,107,481 (ACPA, 2010).

Farmers of the region produce a combination of cereals, pulses, and oilseeds. Cereals account for about 74.71% of the total cultivated area (the largest percentage) and 80.56% of the total crop production of the country (CSA, 2010). Among cereals, Maize is one of the important crops grown in the region. In the 2010-production year, it accounted 11.90% (355,508 ha) and 17.30% (8.01 million quintals) in cultivated land area and in yield of the total cereals produced in the region respectively. Maize ranks fourth next to teff, sorghum and wheat in cultivated area and third next to teff and wheat in yield of the total cereals produced in the region. In addition, the proportion of improved maize seed utilized in 2010 crop year was 36.23% (BOARD, 2010).

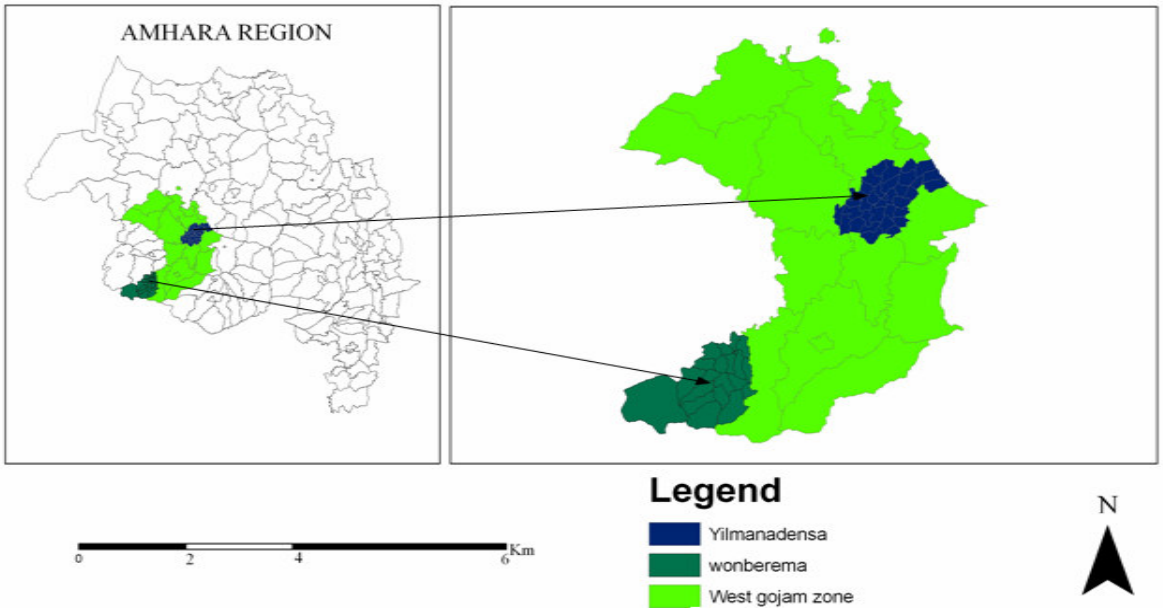
### 3.1.2 West-Gojjam Zone

West Gojam zone is one of the eleven administrative zones established under the ANRS. It is located on the West of the Region and covers a total area of about 13760 Sq. Km, which accounts for 8.76% of the area of the region. The administrative zone is bounded in the North by North and South Gondar Administrative zones, in the East by South Gondar and East Gojjam Administrative zones, in the South by East Gojjam Administrative zone and Oromia National Regional state and in the West by Awi Administrative Zone and Benshangul Gumuz National Regional State. The administrative zone is divided in to 13 rural and 2 urban woredas. This zone has 67.80%, 22.80% and 9.4% of the total area is flat, mountainous and valley, respectively (WG ZOA, 2010). The water source of the zone is mainly encompasses the source of Blue Nile basin (Gish Abay) and the zone is known to have a number of perennial and seasonal rivers. Besides, one fourth of Lake Tana, which is approximately 648 $km^2$, is located in this zone. Based on the traditional agro-climatic classification, West-Gojjam zone has three climatic divisions, namely, Dega (16.7%), Woina-Dega (72%) and Kola (11.3%). (WGZOA, 2010). Average annual temperature is between $14^0$c-$30^0$c.

The annual rainfall amount varies between 800 to 1600mm, which is in most cases sufficient for a variety of crops to grow, According to the Socio-Economic Survey made by West-Gojam Zone Plan and Economic Development Office (2010), out of the total area of the zone, 58.42percent accounts for cultivated land, 17.67% for grazing, 10.15% for forest, and 13.75% other area. The total population of the zone in 2010 estimated to be about 2.221 million, of which 90.62% is estimated to live in the rural areas and agriculture is their main stay of living (BOFED, 2010).The common style of production is a mixed farming system of crop production and livestock. The major crops grown in the zone include teff, barely, wheat, maize, millet, beans, pea, chickpea, etc.

Maize is first in cultivated area coverage 162,846.63ha (30.15%) of the total cultivated area and first in production 9,326,916 quintals (40.49%) of the total grain production in the zone (WGZOA, 2010). Though productivity is low, the zone has a good potential in livestock husbandry, fishery and beekeeping. According to the estimation of the office of Agriculture in the year 2010, there were about 1.25 cattle, 0.4 sheep, 0.188 goats,0.176 equine and 2.01poultry ( all are in million).

There are 429 primary cooperatives with a total of 281,531memebers of which 11.22 are women, and having a total asset of about 219.256 million Birr and 5 cooperative unions serving 200 member primary cooperatives having 235,473 individual members and having total asset of 62,467,575 birr. Cooperatives is serving as the main source of credit and marketing of farm inputs and out puts for their members (WGZOCP, 2010). The major social service infrastructures, which are available in the zone, are education, health and potable water facilities, all weather road, electricity and telecommunication.




Fig$_2$. Location Map of the study Area

Source: Amhara Environmental Protection and Land Use Authority, 2011

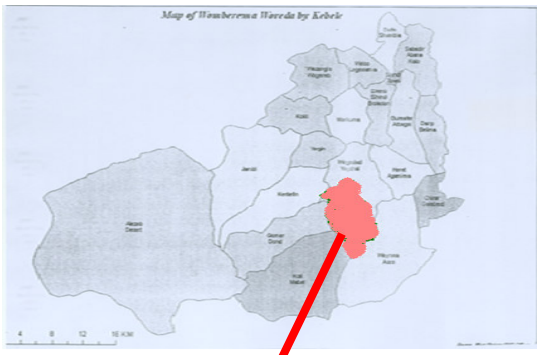


**Fig.3 Location map of Marwoled**

**Fig.4 Location map of Goshyie**

Source: West Gojjam Zone EPLAU Department, 2011

### 3.1.3 Womberma Woreda

Womberma woreda is one of the fifteen woredas of West Gojjam zone. It is located on the west of the Zone. Womberma is surrounded by by Bure woreda in the east, Awi Administrative zone in the North and West, and Oromiya National Regional State in the south. The woreda is divided in to 19 rural and 1 urban kebele. Shindy is the main town of Womberma, which is found 17 km from Bure town, 165 km from Bahir Dar on the south-west and 423 km from Addis Ababa through Bure town. The woreda located at 1500 to 2400 masl. It is predominantly plain (75% of the total area). Based on the traditional agro-ecological classification, the woreda is found in Woina-Dega and Kolla climatic zones that cover 68% and 32% of the total area, respectively, the mean annual temperature ranges from $21^{0}$c-$26^{0}$c, and the mean annual rainfall ranging from 1100mm to 1430 mm.

The land use pattern shows that out of the total area coverage of the woreda (121,070 hectares), 111384.4 hectare (92%) is arable land where 77181.75hectare (75%) is currently cultivated, 6,053.50 hectare used for grazing, 28149.15 hectre cultivable, 4,592 hectare forest cover, 2288.60 hectare for others and the rest about 2,805 uncultivable land. Cropping predominantly rain-fed and mixed agriculture is the main activity in the woreda for their livelihood. Amhara ethnic group is the dominant in number. According to the woreda Finance and Economy Development Office the total population in 2010 was estimated to be 106,941 from which 52,734 are females, and 54,207 are males. From the total population 88.75% (94,909) live in the rural areas and 11.25% (12,032) live in urban center (WWOFED, 2010). The woreda has district markets namely shindy and village markets Wogedad, Markuma,Kuche and Woinnma, among these Shindy is the biggest. Maize is the most important food and cash crop followed by wheat, teff and pepper produced in the woreda(WWOA, 2010). The plain topography combined with favorable climatic and fertile soil makes the woreda suitable for crop production and livestock husbandry.

As part of mixed farming, the woreda posses 84,407 cattle; 30,862 sheep; 4,478 goats; 9,913 equine; 9,1189 poultry and 5,576 bee hive(WWOA,2010). Womberma has 17 health posts and 5 health centers, 3 primary schools, 26 primary and medium schools, 1 secondary school, 1 preparatory school and 23 alternative schools; 27.5km all-weather road and 80km dry-weather road and all kebeles in this woreda has access to telecommunication service

In the production year of 2010, the supply of improved maize seed was only 34.06 % from the total demand of the farmer (WWOA, 2010). In addition, 53.32% and 46.68% of the woreda's maize land is covered with BH660 maize seed and local maize seed, respectively.

Womberma is one of the major maize producing areas in the ANRS. Wheat, teff and Pepper are major crops produced in the woreda in large quantities compared to other crops. Maize ranks first in cultivated area (11,793.25ha.) and production (748,799qts.), compared to each main crop produced in the woreda during 2010. This is because farmers have a long period of experience in the use of improved technology in the production of maize. The productivity of the maize crop was (45-88 qts/ha) (WWOA, 2010). Maize is produced for home consumption and for cash.

Womberma has 6 multi-purpose service cooperatives, 14 saving and credit cooperatives, 1 seed producer's cooperative, 3 mineral cooperatives, having total members of 8,413 with a total asset of Birr 13.98 million (WWOA, 2010).

Womberma woreda is the one, which produce hybrid maize seed since 2008. Farmers in Marwoled site have experience with Hybrid Maize and Bread wheat seed multiplication. Hybrid maize seed production and marketing in Womberma was started 3 years ago, when Ethiopian seed Enterprise (ESE) with the support of regional partners through Seed Multiplication farmer groups. The number of farmers engaged in hybrid Maize seed production and area covered with hybrid maize seed production has been increasing over time, for instance, In 2008 the total area covered with hybrid maize seed production was 9.40 ha, and 57 farmers were participated and produce 284 quintals of hybrid maize seed and supply to ESE Bihar Dar Branch. In 2010 crop season, 147 farmers participated in hybrid maize seed production within 76ha of land produce 2800 quintals of Hybrid maize seed, and supply to Amhara Seed Enterprise (ASE), based on their contractual agreement (WWOA, 2010). On the mid of 2010 hybrid maize seed multiplication farmers groups organized themselves in hybrid maize seed producer and marketing cooperative(SPC) to increase their economic benefits.

### 3.1.4 Yilmanadensa Woreda

Yilmana Densa woreda is also one of the fifteen woredas of West Gojjam Administrative zone; It is located on the center of the Zone. Yilmanadensa is surrounded by Gonji woreda and South Gondar Administrative Zone in the east, BahirDar Zuria woreda and Mecha Woreda in the North, Mecha Woreda and Awi Administrative Zone in the West, and Quarit and Sekela Woreda

in the South. The woreda is divided in to 35 Rural and 1 urban kebele. Its capital town, Adet is found 42 km. from Bahir Dar on the south and 443 km from Addis Ababa through Mota.

The woreda's population is estimated to be 226,430 of which 113,692(50.21%) and 112738(49.79%) are females and males, and of these 90.40 %( 204,692) are assumed to live in the rural areas, while only 9.40 %( 21,739) are reported in urban areas (BOFED).

The land use pattern shows that out of the total area coverage of the woreda (112,889 hectares), 84,856ha (75.17%) is arable land where 79,688(93.91%) is currently cultivated, and grazing, forestland and other land covers 13,343.48ha (11.82%), and 10,950.23ha (9.7%) of the total area, respectively (YDWOA, 2010). The woreda has an elevation varying from 1552 to 3535 masl. Approximately 56% of the total area is sloppy, 20%mountain, 16% plain and 8% valley. Based on the traditional agro-ecological classification, the woreda has Dega and Woina-Dega climatic zones that cover 24.27% and 75.63% of the total area, respectively. The average annual temperature ranges between $8.8^{0}$c-$25.2^{0}$c, and the average annual rainfall ranges between 1100-1270 mms. According to the YDWOA identification, the woreda has three types of soil: red (65%), brown (15%) and black (20%). Favorable climatic condition and fertile soil makes the woreda suitable for crop production and livestock husbandry.

In the woreda, the rural people depend on crop production and livestock husbandry for their Livelihood. Cropping is predominantly rain fed. As part of mixed farming, the woreda posses 118,015 cattle,107,131 sheep, 14,852 goats, 22,986 equine 120,280 poultry and 12,874 bee hive(WGZOA, 2010). When we look at the woreda's infrastructure, it has 33 health posts and 4 health centers, 53education centers; 30 km all weather and 38km dry-weather roads 30 kebeles have access telecommunication service.

Through the agricultural extension services rendered to the farmers for a long period, the farmers of the woreda are rich enough in using different improved agricultural inputs. Fore instance, in the production year of 2010, the farmers make use of 1822.50 quintals (54.92%) and 1495.75 quintals (45.08%) of improved varieties and local maize seed respectively. Moreover, as most farmers of the woreda are users of agricultural inputs, they are also credit users. The main sources of this credit are the multipurpose agricultural cooperatives, saving and credit

cooperatives and Amhara Credit and Saving Institute (ACSI). There are 15 multipurpose service cooperatives, 11 saving and credit cooperatives, 1 seed producer's cooperative, 2 consumer cooperatives, 2 Dairy cooperatives,1 miming cooperative, having a total of 24,599 members with total asset of Birr 16.73 million.(YDWOCP, 2010). The major types of services given by the extension workers to farmers include advice on the methods of cultivation, use and application of fertilizers and improved seeds, soil and water conservation, animal husbandry, post harvest management and use of improved technologies.

The study woreda is one of the major maize producers in the Region. Teff, Barley and Wheat are also major crops produced in the woreda in large quantities compared to other crops. Maize ranks first in production and second to Teff in cultivated area (13273ha.) compared to each main crop produced in the woreda during 2010(YDWOA, 2010). This is due to the fact that as farmers have a long period of experience in the use of improved technology in the production of maize, the productivity of maize was 34-66 qts/ha in 2010. At present, almost 54.92% of the maize land is covered with improved hybrid maize seed. They produce maize for home consumption and for cash. The study woreda is the one, which produce hybrid maize seed at local level since 2009. Farmers in Goshye site have experience with seed multiplication of Hybrid Maize ($BH_{660}$ variety) and Teff (Qunchoo vatiety). Hybrid maize was introduced two years ago, with the support of Local Seed Business (LSB) project implemented by regional partners with Farmer-based seed Multiplication and marketing scheme. The number of farmers engaged in hybrid Maize seed production and area covered with hybrid maize production has been increasing over time (YDWOA, 2010).

## 3.2 Seed Producers Cooperatives

### 3.2.1 Marwoled

Farmers in Marwoled have a good experience with seed multiplication of varieties of several crops. In particular Bread wheat, Faba bean, Hybrid maize and Pepper. Bread wheat was introduced in the area about 11 years ago. Hybrid Maize seed production and marketing was started in Marwoled in 2008 when ESE with support of Regional partners the farmers Based Seed Multiplication and Marketing scheme. The number of farmers engaged in and the area covered with hybrid maize seed production in Marwoled has increased over time. AsTable2. shows in 2008 and 2010 production season 9.40ha and 76ha of land covered with hybrid maize

seed production, 38 and 147 Farmers were participated in hybrid maize seed production and marketing, respectively. In addition, produce 284qt and 2800quntqals of hybrid maize seed and sold to Amhara Seed Enterprise. July 2010 the hybrid maize seed producer farmers organized themselves in Seed Producer's Cooperative based on Cooperative values and principles with the objective of facilitating members to produce market demanded seeds and to achieve economies of scale for their produce through reduction of marketing costs of farm inputs and outputs thereby to gain better price for their seed. Marwoled seed producer's cooperative has 147 members and a total asset of birr 17,640. Even though, Marwoled seed producer's cooperative set its vision and objective precisely and conducting members meeting regularly to increase member's awareness in hybrid maize seed production, cooperative marketing and organization, other objectives are not performed as expected due to lack of experience in hybrid maize seed production and cooperative marketing and lack of technical support from cooperative promotion office.

### 3.2.2 Goshyie

Farmers in Goshyie have experience with seed multiplication of varieties of several crops including Teff, Hybrid maize and potato (previously). Hybrid Maize seed production and marketing was started in Goshyie during 2009 when LSB project with support of Regional partners the farmers Based Seed Multiplication and Marketing scheme. The number of farmers engaged in, the area covered with hybrid maize seed production, and marketing in Goshyie has increased over time. As Table2 shows in 2009 and 2010 production season 6 ha and 28ha of land covered with hybrid maize seed production 23 and 136 Farmers were participated in local hybrid maize seed production and marketing, respectively. And produce 86qt and 880 quintals of hybrid maize seed, respectively. And sold to Amhara Seed Enterprise based on their contract agreement. June, 2010 hybrid maize seed producer of Goshyie farmers organized themselves in Seed producer's Cooperative based on Cooperative values and principles with the objective of facilitating members to produce market demanded seeds and to achieve economies of scale for their produce by reducing the marketing costs of farm inputs and outputs thereby to gain better price for their seed. Goshyie seed producer's cooperative has 136 members and a total asset of birr3227. Even though, Goshyie seed producer's cooperative set its vision and objective precisely and conducting members meeting regularly to increase member's awareness in hybrid

maize seed production, cooperative marketing and cooperative organization, other objectives are not performed as expected due to lack of experience in hybrid maize seed production and cooperative marketing and lack of technical support from cooperative promotion office.

Table$_2$. Trends of $BH_{660}$ Hybrid maize seed production and marketing in the study site

| Year | Marwoled | | | Goshyie | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Production area(ha) | Yield (qt) | Quantity supplied (qt) | Production area(ha) | Yield (qt) | Quantity supplied(qt) | Production area(ha) | Yield (qt) | Quantity supplied(qt) |
| 2008 | 9.4 | 284 | 284 | - | - | - | 9.4 | 284 | 284 |
| 2009 | 50 | 1700 | 1700 | 6 | 86 | 86 | 56 | 1786 | 1786 |
| 2010 | 76 | 2800 | 2800 | 28 | 880 | 880 | 104 | 3680 | 3680 |

Source: Respective woreda Office of Agriculture,2011

Table3. Data of Marwoled and Goshyie Seed Producers Cooperatives members

| SPC | Members | | | Asset | | |
|---|---|---|---|---|---|---|
| | Male | Female | Total | Asset | Liability | Capital |
| Marwoled | 108 | 39 | 147 | 17,640 | - | 17,640 |
| Goshyie | 129 | 7 | 136 | 3227 | - | 3227 |
| Total | 237 | 46 | 283 | 20867 | - | 20867 |

Source: Respective Seed Producers Cooperative, 2011

## 3. 3 Methods of Data Collection

Both primary and secondary data had been collected. Primary data sources were Seed producer cooperative members from two seed producers' cooperatives. The data were collected formally by individual interview using structured-interview schedule and informally through group discussion with key informants using checklist.

Secondary data sources were Womberma and Yilmanadensa woreda agricultural office, West Gojjam Zone Agricultural Department, Amhara Region Bureau of agriculture, Amhara Seed Enterprise(ASE), Amhara Bureau of Finance and Economic Development and CSA and their different publications,. Besides, different and relevant published and unpublished reports,

bulletins and websites were consulted to generate relevant secondary data on Hybrid maize seed production and Marketing.

## 3.4 Sampling techniques, procedures and sample size

To analyze the performance of hybrid maize seed production and marketing in the study area, Multi-stage sampling techniques were employed to select the study sites and draw sample farmers for the study.

From 15 woredas of West Gojjam zon, Womberma and Yilmana Densa Woreda were selected purposively, considering their involvement in local hybrid maize seed production and marketing. Two seed producer's cooperatives (one from each woreda), Marwoled SPC from wonberma and Goshyie SPC from Yilmanadenasa were selected purposively considering their participation in local hybrid maize seed production and marketing. Marwoled has 147 SPC members and Goshyie has 136 SPC members, which are local hybrid maize seed producers. Based on their proportion 72 and 68 respondents were selected by simple random sampling technique from Marwoled and Goshyie SPC members respectively. Thus, the total sample size was 140.

Table4.SPC members and sample size of respondents

| Name of Seed Producers' Cooperative (SPC) | Total population (SPC Members) | Total sample size | Share of sample size (%) |
|---|---|---|---|
| MARWOLED | 147 | 72 | 51.43 |
| GOSHYIE | 136 | 68 | 48.57 |
| TOTAL | 283 | 140 | 100 |

Source: Own survey, 2011

## 3.5 Methods of Data Analysis

Two types of data analysis, namely descriptive statistics and econometric analysis were employed for analyzing the data from the sample farmers.

### 3.5.1 Descriptive statistics analysis

Mean, standard deviation and percentage were employed to compare and contrast the two seed producer's cooperative sample members with respect to some demographic and socio-economic characteristics of the respondents. The gross margin earning level was calculated by using percentage and the market share of Seed Producers Cooperative members were analyzed by using concentration ratio. Furthermore, the potential variables hypothesized to affect the quantity supply of local hybrid maize seed were tested whether they are statistically significant or no using t-statistics and chi-square ($\chi^{2)}$ tests. The t-test was used to test the significance of the mean value of continuous variables of respondents, similarly, potential dummy/explanatory variables were tested using the chi-square (($\chi^{2)}$ distribution .The statistical package SPSS version17 and 16 was employed to compute the statistical tools.

### 3.5.2 Econometric Analysis

Asfaw(1998) stated that there is no decisive statistical ground for model specification among alternatives. As he further noted, recent studies are commonly using regression models to estimate the supply function. Asumugha(2008) adapted this model for analysis of the supply of Seed Yams in Nigeria. And also Kindie(2007) employed this model to analyze the determinant factors of supply of Sesame in Metema woreda, Amhra Region, Ethioipa. Likewise, for this particular study, Multiple Regression model (OLS) was employed to estimate the influence of those variables on the quantity supply of hybrid maize seed in Marwoled and Goshyie Sites. With the assumption that the disturbance term Ui interring the regression model is normally distributed (central limit theorem)

Multiple Linear Regression Econometrics Model Specification (Following Guajarati, 2004)

The OLS regression is specified as:

Y = f (Formal education, Farm land size, Amount of UREA fertilizer, Training, Experience in contract farming, Access to credit, Frequency of extension contact, Time of seed supply, access to market)

$$Y_i = \alpha_i + \beta_1 X_1 + \beta_2 X_2 + \_\_\_ + \beta_9 X_9 \text{ Ui} \qquad (1)$$

Where: $Y_i =$ Quantity Supply of Hybrid Maize Seed

$\alpha_i$ = Intercept

$\beta_{1\text{-}\beta 9}$ = Coefficient of $i^{th}$ explanatory variable

$X_{1\text{-}9}$ = Vector of explanatory variable

Ui = disturbance term

### 3.5.3 Statistical tests of multicollinearity problem

Before fitting the model, it is necessary to carry out multicollinearity test because of the fact that multicollinearity may cause lack of significance of individual independent variables, while the overall model may be strongly significant (Monteshwe, 2006). It may also result in wrong signs and magnitudes of regression coefficient estimates and consequently in incorrect conclusions about relationships between independent variables. Different methods are often suggested to detect the existence of multicollinearity problem. Among them, variance inflation factors (VIF) technique was employed to detect multicollinearity in continuous explanatory variables (Gujarati, 2003) and contingency coefficient (CC) for dummy variables (Healy, 1984; cited in Paulos, 2002).

According to Gujarati (1995) VIF (Xi) can be defined as

$$VIF(Xi) = \frac{1}{(1 - R_i^2)} \qquad (2)$$

Where,

$R^2$ is the multiple correlation coefficients between Xi and other explanatory variables. For each selected continuous explanatory variables, (Xi) was regressed on all other continuous explanatory variables, and the coefficient of determination ($Ri^2$) was constructed for each case. The larger the value of $Ri^2$, the higher the value of VIF (Xi) causing higher collinearity in the variable (Xi). For continuous variables, as a Rule of thumb, values of VIF greater than 10, are often taken as a signal for the existence of multicollinearity problem in the model (if the value of $Ri^2$ is 1, it would result in higher VIF and cause perfect multicollinearity between the variables) (Gujarati, 1995).

In the same line, the Contingency coefficients(CC), were computed for dummy variables from chi-square ($\chi^2$) value to detect the problem of multicollinearity (the degree of association between dummy variables) According to Heal (1984; as cited in Paulos, 2002), the dummy variables are said to be collinear $i^{th}$ value of contingency coefficient is greater than 0.75

$$C.C = \sqrt{\chi^2 / N + \chi^2} \quad (3)$$

Where,
C.C is contingency coefficient,
N is sample size,
$\chi^2$= chi-square values.

## 3.6. Marketing margin

Margin determination surveys should be conducted parallel to channel survey. To determine the channel, one asks the questions "From whom did you buy?" and "To whom did you sell?" Scott (1995) pointed out to obtain information concerning the margins, agents have to answer the question "what price did you pay?" and "what was the selling price?" The cost and price information used to construct marketing cost and margin were gathered during fieldwork conducted.

A marketing margin really measures the shares of the final selling price that is captured by a particular agent in the market chain. It includes costs and some additional net income. For firms acting as a seller, results measure the character of the firm's adjustments to the effective demands for their out puts.

Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage (Mendoza (1995). Exchange activities add ownership benefits to products and generate income for sellers. Not all of this income is a pure profit. In fact, a big marketing margin may result in little or no profit, or even a loss for the seller involved. That depends on marketing costs as well on the selling and buying price. Marketing margins are not always earned only by middlemen, but other Channel members like producers, assemblers and transporters also can earn it (Mendoza, 1995).

### 3.6.1 Total Gross Marketing Margins

As Mendoza (1995) argued, when there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments and then comparing them with the final price to the consumer. The consumer price is then the base or the common

denominator for all marketing margins. Computing the total gross marketing margin (TGMM) is always related to the final price or the price paid by the end consumer and expressed as a percentage

$$TGMM = \frac{\text{End buyer price- First seller price}}{\text{End buyer price}} \times 100 \quad (4)$$

Where, TGMM = Total gross marketing margin

### 3.6.2 Producer's Gross Margin (GMMP)

It is useful to introduce the idea of 'farmer's portion', or 'producer's gross margin' (GMMp) which is the portion of the price paid by the consumer that goes to the producer. The producer's margin is calculated as:

$$GMMP = \frac{\text{End buyer price –Marketing gross margin}}{\text{End buyer price}} \times 100 \quad (5)$$

Where, GMMP= the producer's share in consumer price

### 3.6.3 The net marketing margin (NMM)

Net marketing margin is the percentage of the final price earned by the intermediaries as their net income after their marketing costs are deducted. The percentages of net income, which can be classified as pure profit depends on the extension to such factors as the middlemen's own (working capital) cost.

$$NMM = \frac{\text{Gross margin – Marketing cost}}{\text{End buyer price}} \times 100 \quad (6)$$

Where, NMM= Net marketing margin

### 3.6.4 Concentration ratio (CR)

This method is the most frequently used measure of concentration in an industry due to its simplicity. It is an easy understandable index of concentration.

The concentration ratio is expressed in the term $CR_{x.}$ which stands for the percentage of the market sector controlled by the biggest x firms. Four firms ($CR_4$) concentration ratio is the most typical concentration for judging the market structure (Kohls& Uhl, 1985; shughart, 1990). This study mainly computed $CR_4$, i.e. Concentration ratio of the biggest four seed producers and

traders. The market is considered to be a highly concentrated one if the four-firm ratio ($CR_4$) of over 50% is generally considered a tight oligopoly at all. $CR_4$ between 25 and 50 is generally considered a loose oligopoly. A $CR_4$ of fewer than 25 is no oligopoly at all. The greater degree of concentration is the greater the possibility of non-competitive behavior existing in the market. For an efficient market, there should be sufficient number of firms (buyers and sellers). Concentration implies the degrees of market power (Suvanichwong, 1997). Market power is the ability of a firm to influence perceptibly the price and quantity in the market. A firm with its market shares less than 10 percent is said to have no market power. Market power emerges if it reaches 15 percent and it gives a significant degree of monopoly when it is 25 to 30 percent (Sheperd, 1997). At market share more than 40 t0 50 percent; the market share is very strong.
The mathematical formulation for concentration ration/CR/ is:

$$CR_x = \sum_{i=1}^{X} P_i \qquad i = 1, 2, 3,\ldots\ldots, x \qquad (7)$$

Where:

$CR_x$ = Concentration ratio of the x top four seed producers/traders in the seed industry.

$P_i$ is the market share of those $x^{th}$ largest seed producers or traders expressed in percent, this was computed by dividing the total volume of $BH_{660}$ seed sales of the biggest four producers or traders (seed distributors) by the total volume of seed sales of all producers/traders at regional market.

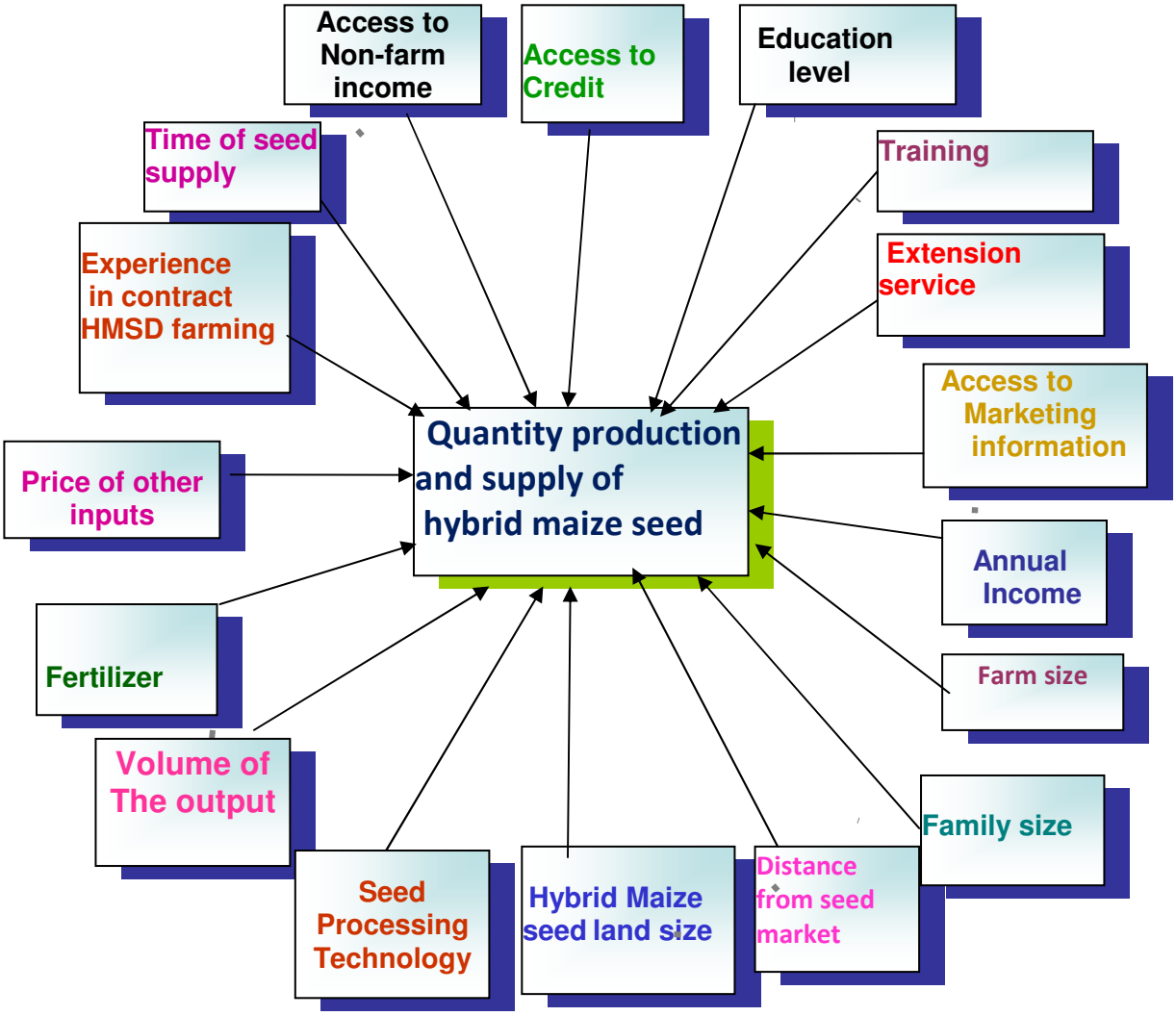



Fig.5 Conceptual model

## 3.7 Determinants of quantity supply of hybrid maize seed in Marwoled and Goshyie.

In this study, an attempt was made to estimate determinants of quantity supply of hybrid maize seed in Marwled and Goshyie using cross-sectional data of the hypothesized variables. The main hypothesized variables included in the analysis were as follows

### 3.7.1 Dependent variable

**Quantity production and supply (QT-SUPP):** It is a continuous variable, which represents dependent variable; refers to the actual quantity produce and supply of locally produced hybrid maize seed to the market by seed producers' cooperative members, which is measured in quintal.

### 3.7.2. Independent Variables

1**. Education level of the household head (EDU_LEVLE):** It is a continuous variable and refers to the grade level of formal schooling of the respondent completed during the survey period. The education level of the household head increased that determines the readiness to accept new ideas and innovations, and easy to obtain, process and use information relevant to the production and marketing of local hybrid maize seed technology increase and use of appropriate Technology increases quality and quantity supply. Therefore, education level was hypothesized to positively influence the quantity supply of hybrid maize seed.

**2. Access to credit (CREDIT):** Access to credit was measured as a dummy variable. This variable is expected to influence the quantity supply of locally produced Hybrid Maize Seed positively on the assumption that access to credit improves the financial capacity of farmers to buy appropriate inputs, thereby increasing production which is reflected in the quantity supply of hybrid maize seed.

**3. Frequency of Contacts with extension agent(s) (FRQCON):** This refers to the number of contacts per month that the respondent made with extension agents. The effort to disseminate new agricultural technologies is within the field of communication between the change agent (extension agent) and the farmers at the grass root level. Here, the frequency of contact between the extension agent and the farmer is hypothesized to be the potential force, which accelerates the effective dissemination of adequate agricultural information to the farmers, thereby enhancing farmer's decision making to adopt better technology that would increase their quantity supply of local hybrid maize seed.

**4. Access to market and Main road (DIS_MKT):** Access to market is a continuous variable that has been measured in hours from the household residence to the market centers. It shows the time spent to go and buy inputs and/ or sell output at the nearest market. As the farmer is nearer (closer) to a market place, the lower is the time spent to marketing activities that increases the time for other productive activities. Moreover, as the farmer is nearer to a market, the higher is the market opportunity of access to market information. The closer the residence of the household to the market center, the more is the quantity supply.

**5. Size of farmland holding (TM_FMLAN):** This is the total land holding, which is continuous variable measured in hectare. The producer who has large land size he would allocate more land to his cash crop (Hybrid maize seed production). Thus, increase in size of farmland is expected to have direct influence on production of hybrid maize seed that would increase the quantity supply of hybrid maize seed.

**6. Size of hybrid maize seed land (SHMSDLAN):** it is a continuous variable, measured in hectare. The size of hybrid maize seed land combined with availability of labor may increase the quantity supply of hybrid maize seed. Hence, the size of hybrid maize seed land is assumed to have direct relation with the quantity supply of hybrid maize seed.

**7. Family size (FAM_SIZE):** It is a continuous variable, measured in man equivalent. Hybrid maize seed production is labour intensive, such as planting, rouging, de-tasseling, harvesting and shelling. i.e., the availability of active labor force in the household, which affects farmer's decision of the volume of production. Since production is the function of labor, availability of labor is assumed to have positive relation with quantity supply of hybrid maize seed. Hence, family size is expected to have positive impact on quantity supply of hybrid maize seed.

**8. Total annual farm income (TAFMIC):** refers to the total annual income generated from farming activity (ies) by the household. Farming is the main source of income for the farm household. This income may strength the production of hybrid maize seed as source of income to purchase farm inputs and hire labor for hybrid maize seed production as well as it helps to

cover marketing costs of hybrid maize seed. Amount total annual income assumed to influence the quantity supply of hybrid maize seed, positively.

**9. Access to non-farm income (NONF_INC):** A dummy variable show income obtained from non-farming activities by the household. This income may strength the production of hybrid maize seed as a source of income to purchase farm inputs for hybrid maize seed production, which increase the productivity, and production of hybrid maize seed and it increases the quantity supply of hybrid maize seed. Therefore, getting income from non-farming activity is assumed to have positive influence on quantity supply of hybrid maize seed.

**10. Access to Training participation (TRAINPAR):** It is a dummy variable, which takes 1 if the respondent is trained about the potential advantages and drawbacks of contractual local hybrid maize seed production and marketing, and 0 otherwise. It is true that as the house hold head trained in the merits of contractual local hybrid maize seed production and marketing, their knowledge and skill had been improved that leads to increases production which increases the quantity supply. Therefore, access to training participation was expected to influence the quantity supply of hybrid maize seed, positively.

**11. Amount of Fertilizer Use (AMFR):** This is a continuous variable which refers to the utilization of DAP and UREA fertilizer to increase the production and productivity of the output which would result increase in the quantity supply of local hybrid maize seed. It is measured in kg per hectare. The variable was expected to influence the households' quantity supply of local hybrid maize seed, positively.

**12. Quantity of out put (YIELD):** It is a continuous variable, which refers to the marginal increase in local hybrid maize seed yield measured in quintals, that has direct influence on the quantity supply of local hybrid maize seed, based on the fact that the contractual agreement and the nature of the product enforces the producer to supply the total yield to the market. Therefore increase in the quantity of local hybrid maize seed is assumed to affect the quantity supply positively, because a farmer that produce high yield can supply more to the market than a producer who had less yield.

**13. Time of seed supply** (TMSDSP)**:** access to time of supply of inbred maize line seed was measured as dummy variable taking value of 1 if the household has access to time of supply of inbred maize line seed, and 0 otherwise. The variable is expected to influence the quantity supply of hybrid maize seed positively on the assumption that access to time of supply of inbred maize line seed fits with the date of planting, which leads to increase production, thereby increases quantity supply of hybrid maize seed.

**14. Price of other inputs (PRIPNT)**:-refers to the availability of adequate and quality input at right time and accessible place with affordable price of complementary inputs other than inbred line maize seed such as fertilizer, pesticides, and herbicides. Measured in Kilogram and liter, availability of adequate and quality farm input at the right time and accessible pace with affordable price encourages the seed producers to increase their quantity and quality produce that improves the quantity supply of hybrid maize seed.

**15. Marketing information** (MKTINFO)**:** This is measured as a dummy variable taking a value of 1 if the farmer had access to marketing information and 0 otherwise. The respondent who has radio, telephone, TV, and high frequency of contact with extension agent is expected to have opportunity to marketing information on price, supply, demands and technological information about hybrid maize seed which affects the production decision of the farmer. Access to marketing information has been hypothesized to influence the quantity supply of hybrid maize seed, positively.

**16. Contract hybrid maize seed production experience (CONTFAEX):** A continuous variable measured in years, which refers to the experience of the respondents in producing and marketing of hybrid maize seed through contractual arrangements including 2010. Therefore, the longer the experience in production and marketing of hybrid maize through contractual arrangement, the higher the accumulated knowledge and skill about the benefit of contract farming, the higher the chance to produce and supply more hybrid maize seed. Therefore, this variable is assumed to influence the quantity supply of hybrid maize seed, positively.

**17. Access to Seed processing Technology (SDPROTEC)**: It is a dummy variable taking value of 1 if the house hold has access to seed processing technology, and 0 otherwise. It refers to the accessibility of seed thresher. If the respondent has access to seed processing technology to carry out seed threshing operation at an accessible level and it lowers the time spent on seed threshing activities that increase the time for other productive activities. Hence, the variable is supposed to influence the quantity supply of hybrid maize seed, positively.

# Chapter IV: Results and Discussions

This chapter deals with the findings, descriptive statistics and econometric models on analysis factors affecting the quantity supply of hybrid maize seed, analysis of costs and margins of hybrid maize seed marketing participants and examine the perception of the seed producers on the existing hybrid maize seed production and marketing arrangement. This chapter, in addition, identify the opportunities and threats of hybrid maize seed production and marketing in Marwoled and Goshyie seed producers cooperative members.

## 4.1. Results of Descriptive Statistics Analysis

### 4.1.1 Household Characteristics

The household characteristics is defined in terms of sex, marital status, level of education, age and family size of the respondent, presented on Table5.

### 4.1.1 Distributions of household by sex

As it is given on table5, the sex composition of the total respondents, reveal that 97.14% male and the remaining (2.86%) are female. When it is disaggregated by the spatial location of Marwoled and Goshyie, in the first SPC there are 1.39% of female and 98.61 male. Whereas in the second; the proportion of male and female households constitutes 95.59 and 4.41percent. Goshyie seed producer's cooperative members have better number of female participants as compared to Marwoled.

The result of chi-square test for the distribution of sex between the two study sites shows Statistically insignificant (Table5)

### 4.1.2 Distribution of household by marital status

Of the total sample, households 94.29 % and 5.71% are married and single, respectively. Given this general, 94.44% of the sample respondents in Marwoled, which is greater than 94.12% of Goshyie are married household head. The participation of single headed household was 5.88% and 5.56 % in Goshyie and Marwoled, respectively. Even though, married household has more labor access than the single household does, the result of the chi-square test for the marital status of the two SPC members was found to be statistically insignificant (Table 5).

### 4.1.3 Distribution of the households by Age

The age of the respondents' ranged from 22 to 80 years with mean of 44.30 and a standard deviation of 10.54 years. Only 0.71% of the sample house hold head had greater than active productive age (above 65 years of age). This indicates that 99.23% of hybrid maize seed producers are middle age, active productive and experienced farming groups. The mean age of Marwoled and Goshyie farmers was 44.63 years and 43.96 with a standard deviation of 8.94 and 12.07, respectively. Even though, the result of independent sample test indicates that there is no significant mean difference between the two study areas; comparing the two groups, on the mean age Marwoled sample household were somewhat older than Goshyie (Table5).

### 4.1.4 Distribution of the household by Family size

The family size of the respondents ranged from 2 to 10 persons per household. The average family size of the sample household was 6.10persons per household with a standard deviation of 1.69. The mean family size of marwoled is 6.32 greater as compared to Goshyie 5.87persons per house hold. The result of t-test reveals that there is no significance difference between the two study sites with respect to family size of the household (Table5). This implies that family size per household has no significant influence on quantity supply of hybrid maize seed.

### 4.1.5 Distribution of the households by level of Education

About 2.14 % of the total sample household heads were illiterate and the rest 97.86% attended formal schooling or at least read and write.

The mean educational level of sample respondents was 2.85 years of attendance of formal schooling with standard deviation of 0.83years and 97.06% of sample household heads in Goshyie has attended an average 2.93 years of formal schooling and 98.61% of Marwoled sample household heads attended an average 2.85 years of formal schooling. More number of Goshyie sample household heads completed primary education 28.78 % compared to Marwoled 16.90%. Nevertheless, the independent sample test result reveals there is no significant mean difference between Marwoled and Goshyie sample household heads with respect to Education (Table 5).

**Table5. Demographic characteristics of sample Households**

| Characteristics (Dummy variables) | | N=72 Marwoled | N=68 Goshyie | N=140 Total | $\chi^2$ /t-value |
|---|---|---|---|---|---|
| Sex | | | | | |
| | Female (%) | 1.39 | 4.41 | 2.86 | 1.151 |
| | Male | 98.61 | 95.59 | 97.14 | |
| Marital status | | | | | |
| | Single (%) | - | 1.47 | 0.71 | 4.811 |
| | Married (%) | 94.44 | 94.12 | 94.29 | |
| | Divorced (%) | 5.56 | 1.47 | 3.57 | |
| | Widowed (%) | - | 2.94 | 1.43 | |
| Literacy level | | | | | |
| | Illiterate (%) | 1.39 | 2.94 | 2.14 | 6.703 |
| | Literate (% | 98.61 | 97.06 | 97.86 | |
| Education (years) | | 2.68 | 3.07 | 2.87 | 2.812 |
| | | (0.85) | (0.80) | (0.85) | |
| Age (year) | | 44.63 | 43.96 | 44.30 | 0.374 |
| | | (8.94) | (12.07) | (10.54) | |
| Family Size (No) | | 6.32 | 5.87 | 6.10 | 1.590 |
| | | (1.55) | (1.80) | (1.69) | |

N = Sample size, Figure in parenthesis indicates standard deviation

Source: Own survey result, 2011

## 4.2 Access to Service

Access to service has important bearing on the observed status of the farmers to motivate to increase the quantity supply of local hybrid maize seed. The most important services identified were agricultural extension, access to farm input, access to training, access to credit, access to seed processing Technology and access to marketing information, are most important factors promote production and marketing of hybrid maize seed production and marketing. This is directly related to farm income.

### 4.2.1 Access to agricultural extension

In the study area, the office of agriculture at woreda and kebele level provides extension services for the farmers in relation to hybrid maize seed production. Fortunately, the whole Marwoled and Goshyie sample house hold heads was beneficiary of this service in 2010 (Table6). Of the total sample respondents, 33.57, 42.86 and 23.57percentage of the sample respondents contacted the extension agent once in a week, once in two weeks and once in a month, respectively. The contact mostly performed in hybrid maize farmland, in farmer's village and in development agent's office sometimes the farmer used telephone. Nevertheless, comparison shows that more of Marwoled farmers (88.89 percentage) had frequent extension contact a minimum of once within two weeks than Goshyie farmers (63.24percentage). The result of the chi-square test revealed that there was a significant difference between the two areas at less than 1% level of significance with respect to frequency of extension contact (Table 6). The reason for frequency of extension contact variation between the two study sites could be the distance of hybrid maize seed farm from development agents' office. In Marwoled the average distance was 10 walking minutes closer as compared to Goshyie (30walking minutes).

Table6. Access to Extension service

| Dummy Variables | N=72 Marwoled | N=68 Goshyie | N=140 Total | $\chi^2$ - Value |
|---|---|---|---|---|
| Extension contact (yes, %) | 100 | 100 | 100 | |
| Once a week (Yes, %) | 43.06 | 23.53 | 33.57 | 14.042*** |
| Once in two weeks (yes, % | 45.83 | 39.71 | 42.86 | |
| Once in a month (Yes, %) | 11.11 | 36.76 | 23.57 | |
| Average distance of the farm from development agents office (Walking minutes) | 10 | 30 | 20 | |

N= Sample size, ***, shows the values statistically significant at 1% level of significance.

Source: Own survey result, 2011

### 4.2.2 Access to credit

Table7 shows that, of the total sample household heads 94.29% pointed out that they need credit. In 2010, only 22.86% of them got access to credit from cooperatives and/or ACSI. The amount of credit taken varies from Birr 167.50 to 3000 and the average credit taken was Birr 989.07 per household. About 66.67% of credit participants got below the mean level of credit. The credit participant of Marwoled sample household got more credit (Birr 1274. 30) than Goshyie farmers (Birr 333.01) did. There was statistically significant difference between Marwoled and Goshyie with respect to the amount of credit at less than 1% level of significant (Table 7). The factor for this variation could be the availability of more credit access in Marwoled as compared to Goshyie.

### 4.2.3 Access to Training Participation

Of the total sample respondents involved in hybrid maize seed production and marketing in 2010, only 17.14% got training access on seed sowing, fertilizer application, rouging, de-tasseling and seed harvesting. 27.78% of Marwoled and 5.88% of Goshyie farmers reported that they have three days of training by woreda office of agriculture and BahirDar University. There was statistically significant difference at less than 1% level of significance with respect to training participation. The cause for variation could be the availability of more training access in Marwoled as compared to Goshyie.

### 4.2.4 Access to Time of seed supply

Even though planting material or inbred maize line seed is an important input to start hybrid maize seed production. In 2010, only 35% of the total sampled households got inbred maize line seed on time of planting. 31.94% and 100% of Marwoled and Goshyie sample households did not get the seed on time of plant. There was statistically significant difference at less than 1% level between the two study areas on the time of access of seed. Based on the result of focus group discussion, in the cause of Goshyie, the reason for variation could be poor communication between farmer seed producer group leaders and the seed supplier (ASE).

Table7. Access to Credit, Training and Time of seed supply

| Dummy Variables | N=72 Marwoled | N=68 Goshyie | N=140 Total | $\chi^2$ /t - Value |
|---|---|---|---|---|
| Credit need (yes, %) | 94.44 | 94.12 | 94.29 | 0.007 |
| Access to Credit taken (yes, %) | 31.94 | 13.24 | 22.86 | 6.942*** |
| Amount of credit taken (Birr) | 1274. 30 | 333.01 | 989.07 | |
| Access to Training (yes, %) | 27.78 | 5.88 | 17.14 | 11.803 *** |
| Time of seed supply | | | | |
| (Yes, %) | 68.06 | - | 35 | 71.197*** |
| (no, %) | 31.94 | 100 | 65 | |

N= Sample size, *** show the values statistically significant at 1% level of significance.

Source: Own survey result, 2011

### 4.2.5 Access to seed processing Technology

As indicated in Table8 , only 45 %(63)respondents have access to seed thresher and 87.50% 0f Marwoled farmers have access to seed thresher service but Goshyie farmers have no access to seed thresher. There is statistically significant difference at less than 1% level with respect to access to seed processing technology. This implies that Marwoled seed producers have more access to seed proceeding technology due to support of ASE (seed thresher).

### 4.2.6 Access to marketing information

The survey result reveals that 62.14 % and 60% of sample respondents has access to own radio and access to telephone, respectively. 62.50 % and 79.17%of Marwoled sample households and 61.76% and 39.71% of Goshyie have own radio, access to personal and wireless telephone service to secure their marketing information. The percentage difference on access to telephone between the two study sites was statistically significant at less than 1% significance level (Table8). Based on the result of focus group discussion and informal discussion with development agents of Goshyie, the telephone net work service in Goshyie did not serve regularly in 2010. This could be the case for variation.

### 4.2.7 Access to Market and Main road

The average distance traveled to get the market service is 1.65and 1.47walking hour for Marwoled and Goshyie, respectively. The average distance traveled by seed producers to get all weather road 30.51 and 46.11 walking minutes for Goshyie and Marewoled sample households, respectively. Analysis of t-test revealed that there is statistically significant mean difference between the two study areas at less than 1% level of significance to get the main road (Table8)**.** This implies that Goshyie has more access to main road.

Table8. Access to services,

| Dummy Variables | | N=72 Marwoled | N=68 Goshyie | N=140 Total | $\chi^2$ /t - Value |
|---|---|---|---|---|---|
| Access to seed processing | | | | | |
| Technology | (Yes, %) | 87.50 | - | 45 | 18.275*** |
| | (No, %) | 12.50 | 100 | 55 | |
| Access to marketing information | | | | | |
| (Yes, %) | Own Radio | 62.5 | 61.76 | 62.14 | 0.008 |
| Access to telephone | | 9.17 | 39.71 | 60 | 22.690*** |
| Distance to all weather road | | 46.11 | 30.51 | 38.54 | 4.512*** |
| (Walking minutes) | | (17.49) | (23.17) | (21.82) | |
| Distance to main market | | 1.65 | 1.47 | 1.57 | 1.011 |
| (Walk in hours) | | (1.57) | (0.58) | (1.07) | |

N= Sample size, *** show the values statistically significant at 1% level of significance.

Figures in parenthesis indicate standard deviation

Source: Own survey result, 2011

## 4.3 Socio-Economic characteristics

### 4.3.1 Household Seed production and marketing Experience

Marwoled sample households have an average 1.73years of experience in hybrid maize seed production and marketing as compared to Goshyie 1.13 years. The independent sample test

revealed that there was statistically significance difference between the two study areas at less than 1% level of significance on the mean years of contract hybrid maize seed production and marketing experience (Table9). The reason for variation could be the difference in year of establishment of contract hybrid maize seed production.

Table9. Household contract farming experience

| Characteristic<br>Continuous variable | N=72<br>Marwoled | N=68<br>Goshyie | N=140<br>Total | t-value |
|---|---|---|---|---|
| Experience in LHMSD Production (Years) | 1.76<br>(0.59) | 1.13<br>(0.34) | 1.46<br>(0.58) | 7.661*** |

N=sample size, *** significantly at less than 1% significance level, Figures in parenthesis indicate standard deviation

Source: survey result, 2011

### 4.3.2 Sample Households land holding

The total cultivated land holdings of the sample households varied from 0.75 to 16.50hectars with an average of 2.41 hectares a standard deviation of 1.71. The average cultivated land size of Marwoled households 3.22 ha with standard deviation of 2.02 was more than as compared to the average cultivated land size of Goshyie households 1.55ha with standard deviation of 0.51. There was a significant difference between Marwoled and Goshyie households with respect to the size of total cultivated area in 2010. The reason for variation could be availability of own land size and access of leased-in land in Marwoled is greater as compared to Goshyie(Table 10).

### 4.3.3 Area Allocation for Seed production

The result of focus group discussion indicates that, the sample household allocation of their plot(s) of land for hybrid maize seed production mainly depends on the economic importance of the crop, the availability of inbred maize line seed and the location of the land within the selected cluster. Based on this fact the sample house hold allocated from 0.125 to 2hectars of land for hybrid maize seed production in 2010. The average land allocation for hybrid maize

seed of Marwoled 0.65 hectare was greater than Goshyie 0.26. There was statistically significant difference with average land allocations for seed production at less than 1% significance level (Table10). This shows that in Marwold more land investment per household on hybrid maize seed production as compared to Goshyie. The reason for variation could be variation in total farmland size and more farm land location was included within the selected cluster.

### 4.4.4 Productivity

The average productivity of local hybrid maize seed was 35.70 qt/ ha with a significance variability between the two study sites. The average productivity in Marwoled was 37.29qt/ha more than as compared to Goshyie (31.43qt/ha). There was statistical difference between productivity (Table10). This implies that the average productivity of hybrid maize seed in Marwoled was more as compared to Goshyie. The reasons for this variability could be differences in experience of hybrid maize seed production, more fertilizer utilization for hybrid maize seed, more extension contact and more access to credit service in Marwold sample households as compared to Goshyie.

Table10. Households total cultivated land holdings,

| Characteristics (Continuous variables) | N=72 Marwoled | N=68 Goshyie | N=140 Total | t-value |
|---|---|---|---|---|
| Total cultivated land size (ha) | 3.22 | 1.55 | 2.41 | 6.630*** |
| | (2.02) | (0.51) | (1.71) | |
| Average land for LHMSD (ha) | 0.65 | 0.26 | 0.46 | 6.688*** |
| | (0.47) | (0.16) | (0.40) | |
| Average land leased- in (ha) | 1.62 | 0.61 | 1.31 | 3.383*** |
| | (1.99) | (0.29) | (1.78) | |
| Productivity (qui/ha) | 37.29 | 31.43 | 35.70 | 7.845*** |

N=sample size, ***, Significant at less than1% significance level. Figures in parenthesis indicate standard deviation

Source: Own Survey result, 2011

## 4.4.5 Annual Income

### 4.5.5.1 Farm income

Table11 indicates that the average annual farming income of the sample household mainly from crop production for the year 2010 was Birr 21,626.70 per household with a standard deviation of 37,127.59. The average annual farm income of Marwoled sample households Birr 31,121.91 per household was much greater than the average annual farm income of Goshyie (Birr 11,575.31). One of the possible reason for this variation could be the average amount of production and supply of hybrid maize seed per household in Marwoled(24.21qt) was greater as compared to Goshyie(8.14qt).

### 4.5.5.2 Non-farm Income

Of the total sample households, only 5.71 % of respondents participated in Non-farm income generating activities. Live animal trading (sheep and cattle), construction wood trading, cart service, wood work activities by males sample households and local alcohol preparation and selling by women household members, are the main sources of non-farm income. Goshyie sample households were more participant in non-farm income generating activities 10.29% as compared to Marwoled 1.38%. The variation could be more access of non-farm income activities and more participants of Goshyie house hold in non-farm activities as compared to Marwoled.

Table11. Households annual income

| Characteristics (Continuous variables) | N=72 Marwoled | N=68 Goshyie | N=140 Total | T-value |
|---|---|---|---|---|
| Annual Total farm income | 31121.91 (49857) | 11575.31 (5112.58) | 21626.70 (37127.59) | 3.216*** |
| Average production and supply Of hybrid maize seed (qt) | 24.21 (16.25) | 8.14 (4.77) | 16.41 (14.52) | 7.845*** |
| Amount of Non farm income | 2000 - | 3431.4 (388.26) | 3252 (3589.40) | 0.349 |

N=sample size, *** Significant at less than1% significance level. Figures in parenthesis indicate standard deviation

Source: Survey result, 2011

### 4.5.6 Amount of input utilized and price of input

#### 4.5.6.1 DAP and UREA Fertilizer

The average DAP and UREA fertilizer utilization of the sample household for hybrid maize seed production in 2010, was 172.27kg/ha and 150.23kg/ha respectively. Marwoled sample household average utilization of DAP and UREA fertilizer was 196.79 and 158.56kg/ha was higher than Goshyie sample households 107.18 kg/ha of DAP and 128.14kg/ha of UREA fertilizer. There was significant difference in DAP and UREA fertilizer utilization between the two study sites at less than 1% of level of significant (Table12). The probable reasons for this variation could be Marwoled sample households have more access to extension service and have more Experience in hybrid maize seed production.

#### 4.5.6.2 Seed

Average inbred maize seed utilization of Marowled sample household was 16.14kg greater than as compared to Goshyie sample households 6.47kg in 2010. There was significant difference between the two study areas in seed utilization. This could be the amount of seed utilization depends on the size of land allocated for hybrid maize seed production.

Table12. Households input utilization

| Variables | N=72 Marwoled | N=68 Goshyie | N=140 Total | t-value |
|---|---|---|---|---|
| Amount of fertilizer (kg/ha) | | | | |
| DAP (kg/ha) | 196.79 | 107.18 | 172.27 | 7.520*** |
| UREA (kg/ha) | 158.56 | 128.14 | 150.23 | 7.560*** |
| Average amount of seed (kg) | 16.14 | 6.47 | 13.68 | 6.460*** |

N=sample size, ***, Significant at less than1% significance level.

Source: Own computation, 2011

### 4.5.6.3 Price of Fertilizer

The average price of DAP and UREA fertilizer for hybrid maize seed production in 2010, was Birr 791 and 655.22. Birr 792 for DA and Birr 644.80 for URED in Marwoled and Birr 789 for DAP and Birr 679.53 for UREA in Goshyie was the average price fertilize. The independent t-test revealed that there was significant difference in the price of UREA fertilizer between the two study areas (12).Based on the result of focus group discussion the cause for price variation of UREA fertilizer was variation in time of purchase. The time of purchase in Goshyie was late as compared to Marwoled.

Table13. Price of Fertilizer

| Variables | N=72 Marwoled | N=68 Goshyie | N=120 Total | t-Value |
|---|---|---|---|---|
| Price of DAP (Birr/qt) | 792.00 | 789.00 | 791.00 | 0.57 |
| Price of UREA (Birr/qt) | 644.80 | 679.53 | 655.22 | 1.865* |
| Price of seed (Birr/kg) | 38.00 | 38.00 | 38.00 | - |

N=sample size,*, Significant at less than10% significance level.
Source: Own Survey result, 2011

## 4.6 Inferences from the Model Result

Before running the model, a test for multicollinearity among the hypothesized independent variables was made using variance inflation factor(VIF) and contingency coefficient (CC) for continuous and discrete variables, respectively. Then those variables detected with serious multicollinearity problem were aggregated with their values and others were excluded from further analysis.

The VIF and CC result for quantity supply of local hybrid maize seed (Table 14and 15) indicates that, there is no any multicollnearity problem among these potential variables included in the model.

**Table14. Variance inflation factor for continuous independent variables**

| Variables | TOLERANCE | VIF $(1-R^2)-1$ |
|---|---|---|
| EDULEVEL | 0.942 | 1.061 |
| FRLANDS | 0 .370 | 2.704 |
| UREA | 0.690 | 2.966 |
| CONFMEX | 0.690 | 1.449 |
| FREQEXCN | 0.807 | 1.239 |
| DIS_MKT | 0.852 | 1.174 |

Source: Own computation, 2011

Table 15 .contingency coefficients for dummy variables

| | TRAINPAR | CREDIT | TMSDSP |
|---|---|---|---|
| TRAINPAR | 1 | | |
| CREDIT | 0.121 | 1 | |
| TMSDSP | 0.058 | 0.189 | 1 |

Source: Own computation, 2011

### 4.6.1 Determinants of quantity supply of local hybrid maize seed

As indicated in the methodology part several variables were assumed to influence the quantity Production and supply of local hybrid maize seed. Among the hypothesized 9 variables, 4 were found to significantly influence the quantity production and supply of local hybrid maize seed. Table15. Show that the multiple linear regression analyses for quantity production and supply of local hybrid maize seed in Marwoled and Goshyie.

The regression model explained 91.5 % ($R^2$=0.915) of the total variation in quantity production and supply of hybrid maize seed. The coefficient of Amount of UREA fertilizer(UREA, $X_3$), contract hybrid maize seed production and marketing experience (EXPCONFM, $X_4$), Access to credit(CREDIT, $X_6$) and Time of seed supply (TMSPSD, $X_7$) influence positively and significantly at 1% and 5% level, respectively.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + Ui$$

Y= -18.176+1.351X1+ .395X2 +.128X3 + 2.367X4 + -.695X5 + .005X6 + 4.632X7 + 2.463X8 + .810 X9 + Ui

### 4.6.1.1 Amount of Urea fertilizer (AMUREAFR)

The result presented in Table16, shows that the amount of UREA fertilizer have positive and significant impact in determining the quantity production and supply of hybrid maize seed. Increase one kg of Urea fertilizer per hectare of hybrid maize seed farm the quantity production and supply of hybrid maize seed would increase by 0.128 quintals. Because the production of Maximum amount of quality hybrid maize seed per hectare determined by the utilization of principal amount of URED fertilizer together with other practices.

### 4.6.1.2 Experience in contract farming (EXPCONFM)

This variable has positive relationship with the quantity production and supply of contracted hybrid maize seed with a significant level of 1%. Being other variables constant, for an addition of one year experience on hybrid maize seed production and marketing, the households' quantity production and supply of hybrid maize seed will be increased by 2.367quintals on the average. This reveals that as the household have a long period of experiences in the production and marketing of hybrid maize seed through contractual arrangement, this would be the base for continuing and participating with other contract farming programs, thereby increasing and diversifying their income.

### 4.6.1.3 Access to Credit (CREDIT)

As the model result depicts the variable access to credit had positively and significantly influence the quantity production and supply of hybrid maize seed at 5% significant level. The result shows those seed producer sample households, who have access to credit from formal financial organization like micro-finance institutions and Cooperatives more probable to participate in hybrid maize seed production and marketing than those who have not. Earlier studies confirm that credit is one of the factors influence the participation in application of new technologies (Yishak, 2005). The regression result of the coefficient (Table16) reveals a

percentage increase in availability of credit for hybrid maize seed production and marketing increases the quantity production and supply by 0.005quintals on the average, where other variables are constant.

#### 4.6.1.4 Time of seed supply (TMSDSP)

As the model result, depict the variable is influence the quantity production and supply of hybrid maize seed positively and significantly at 5% level of significance. Access to time of seed supply to fit with the time of planting would result increase the quantity production and supply of hybrid maize seed by 4.632quintqls on the average. This reveals that the household get the seed just on the time of planting along with the available resources can harvest and supply the maximum yield of hybrid maize seed thereby increase the income of the household.

Table16. Regression results of LHMSD quantity production and supply model

| SI. No | Particuliers | Parameter | Regression coefficient | t-value |
|---|---|---|---|---|
| 1 | Intercept (constant) | $\alpha$ | -18.176 | -1.747 |
| 2 | Education level (EDU-LEVEL) | $X_1$ . | 1.351 | .722 |
| 3 | Total farm land size (FRMLADS) | $X_2$ | .395 | .554 |
| 4 | UREA (UREA) | $X_3$ | .128*** | 5.138 |
| 5 | Contract farming Experience (CONFMEX) | $X_4$ | 2.367*** | 3.553 |
| 6 | Frequency 0f extension contact (FREQEXCN) | $X_5$ | -.695 | -.552 |
| 7 | Credit (CREDIT) | $X_6$ | .005*** | 4.043 |
| 8 | Time of seed supply (TMSPUSD) | $X_7$ | 4.632** | 1.928 |
| 9 | Access to Training (TRAINPAR) | $X_8$ | 2.463 | .948 |
| 10 | Access to Market(DIS-MKT) | $X_9$ | .810 | .231 |
| | $R^2$ | | .915 | |
| | Adjusted $R^2$ | | .882 | |
| | F-value | | 27.524 | |
| | Sample size | | 140 | |

Note '***, and **, significantly at less than 1% and 5% significance level, respectively.
Source: Own computation result, 2011

## 4.7 Hybrid maize seed marketing chains

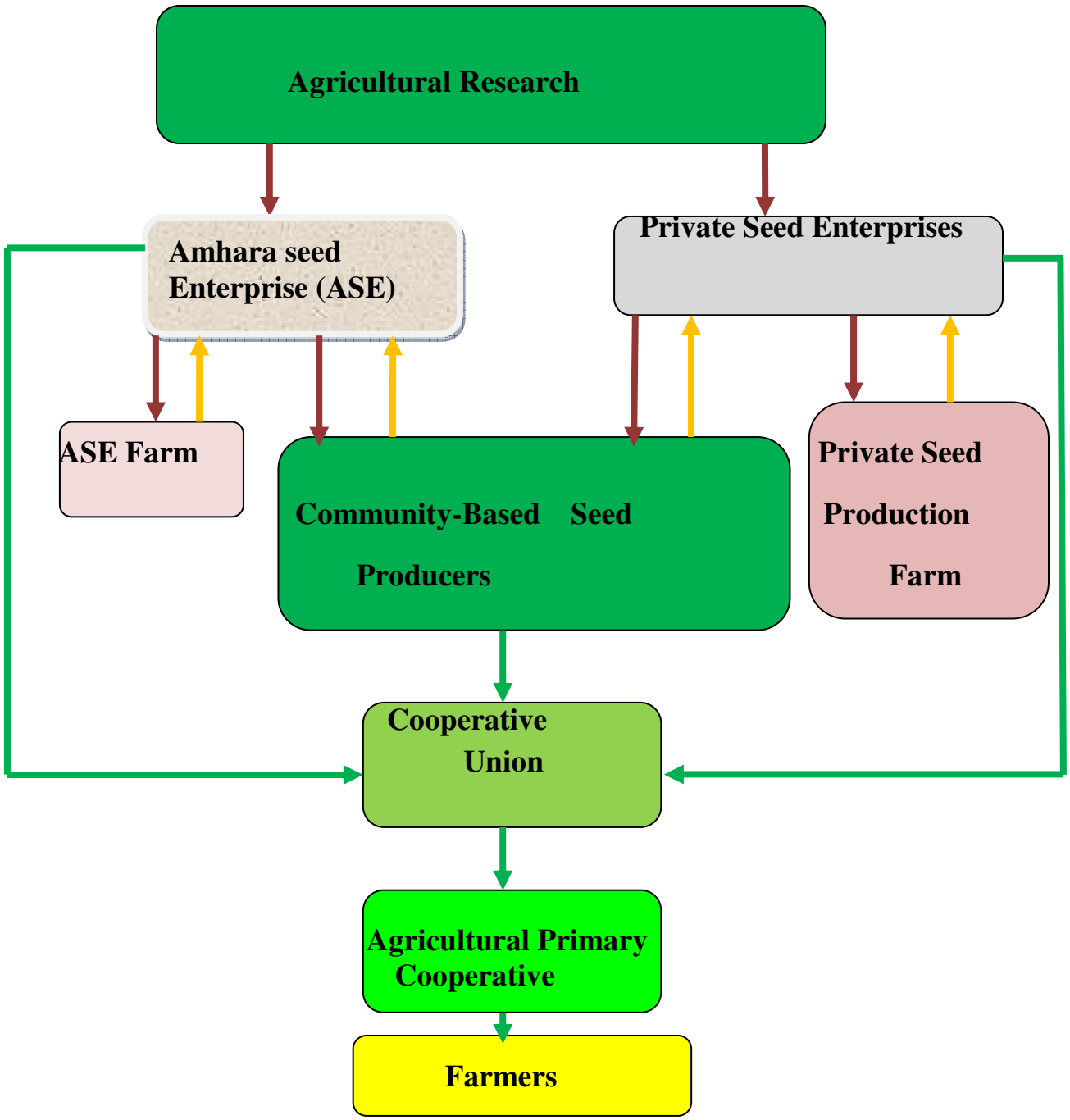
As Mendoza (1995) pointed out some traditionally, accepted definitions help to identified and classify participants in the marketing process. In the real world, these classifications are by no means mutually exclusive.

In this regard hybrid maize seed producers, contractors (ASE), cooperative unions and primary cooperatives were identified as hybrid maize seed marketing participants in the study area even though some of the agents accomplish one or more of the marketing functions.

The hybrid maize seed market channels, depicted in figure 3. The result revealed that there are four main marketing channels obtained from the survey. Informal survey suggested that there are also possibilities those farmers sell their products directly to consumers and retailers.

The formal marketing channels of hybrid maize seed markets in terms of service and quantity flow of hybrid maize seed in 2011 from producer to reach the ultimate users (farmers) passes through a maximum of four stages.

Fig.6 Formal Hybrid maize seed distribution Channel in the study area




Source: ANRS, BOA, 2011

**Where**:

- Supply of inbred maize line seed
- Supply of Unprocessed HMSD
- Supply of Certified HMSD

## 4.8 Cost structure and profitability of locally produced hybrid maize seed

### 4.8.1 The Production cost structure of hybrid maize seed at producers level

Based on the data collected from sample households during the survey period the production cost structure of hybrid maize seed summarized as (Table 17).

Table17. Production Cost structure and profitability, 2010/11

| Cost Items | Cost (Birr/ha) | Cost (Birr/qt) |
|---|---|---|
| Plowing | 1620.00 | 45.38 |
| Inputs/ fertilizer/ | 2413.06 | 67.59 |
| Planting | 308.00 | 8.63 |
| Weeding | 720.00 | 20.17 |
| Top-dressing | 220.00 | 6.16 |
| De-tasseling | 284.00 | 7.95 |
| Harvesting | 620.00 | 17.37 |
| Threshing | 480.00 | 13.45 |
| Land lease | 2688.96 | 75.32 |
| Land use tax | 55.00 | 1.54 |
| Credit Interest cost | 109.30 | 3.06 |
| Transport from farm to sales center | 330.00 | 9.24 |
| Weighing cost | 35.70 | 1.00 |
| Total production cost | 9884.02 | 276.86 |
| Selling price/producers price Birr/ha | 26775 | 750.00 |
| GMMp(%) | - | 52.12% |
| Profit (Birr) | 16890.98 | 473.14 |

Source: Own survey result, 2011

As Table17 depicts of the total production costs, land leased-in cost (27.21%) and farm input purchasing cost (24.41%) was the highest production cost for the producers.

### 4.8.2 Marketing Costs and Profitability

#### 4.8.2.1 Marketing cost

Table18. Shows different types of marketing cost related to the transaction of Local hybrid maize seed at Seed producers, contractor (ASE), Cooperative unions and Primary cooperatives. The structure of marketing cost reveals that from the total marketing costs: Seed cleaning, dressing and packaging cost accounts 92Birr/qt (19.89%), Transport cost 89.42 Birr/qt (19.34%) and warehouse cost 60Birr/qt (12.97%), respectively. And totally constitutes 52.20% of the total marketing cost of local hybrid maize seed. This is due to the nature of the commodity and the distance of the seed processing plant from the seed production site and distance from the potential seed users.

#### 4.8.2.2 Profitability

The profitability of the sampled farmers was calculated by taking the average total income and expense of all the sample seed producers' in 2010. The result showed clearly that hybrid maize seed production was profitable for the specified period. Hybrid maize seed producers earned a net profit of Birr 16364.88/ ha, and Birr 458.40/quintal (Own survey result, 2011). The average yield of locally produced hybrid maize seed for the year 2010 was 35.70 qt/ha and the average selling price of all locally produced hybrid maize in 2010 was 750Birr/qt (ASE, 2011), used to estimate the profitability per quintal (Table10).

Table18. The total marketing cost of Local hybrid maize seed

| Cost items | Cost Birr/qt | Percent of shares from total marketing cost |
|---|---|---|
| Sack | 6.50 | 1.41 |
| Weighing | 1 | 0.22 |
| Loading | 15 | 3.24 |
| Unloading | 11 | 2.38 |
| Transport cost | 89.42 | 19.34 |
| Ware house cost | 60 | 12.97 |
| Cleaning & Packaging cost | 92 | 19.89 |
| Loss (quality loss) | 35.02 | 7.57 |
| Chemical Fumigation | 15.17 | 3.28 |
| Perdiem for store man | 20 | 4.32 |
| Salary for store man | 48 | 10.38 |
| Credit interest cost | 42.02 | 9.09 |
| Seed purchasing cost | 27.31 | 5.91 |
| **Total cost** | **462.44** | **100** |

Source: ASE, 2011

Table18 shows that excluding seed purchasing cost. Seed cleaning and packaging cost 22.02%, Warehouse cost 14.77% and Transport cost 13.17% was constituting 49.55% of the total marketing cost of ASE. This is due to limited number of seed processing plant and the location of the processing plant is in the main city (at BahirDar) highly contribute on the seed processing cost and warehouse cost. Moreover, Distance of the seed processing plant from potential hybrid maize seed production farm and from ultimate hybrid maize seed users increases the transport cost of the seed.

Table20 indicates seed transport cost 81.32% was the highest from the total marketing cost of Cooperative Union this is because the seed distribution center of ASE is at BahirDar, which is 180km far from the study area.

Table19 Cost structure and Profitability of Local Hybrid Maize Seed Contractor, 2010/11

| Cost items | Cost Birr/qt | Percentage of shares from total marketing cost |
|---|---|---|
| Purchase price of raw LHMSD | 750.00 | 64.22 |
| Loading | 12.00 | 1.03 |
| Unloading | 8.00 | 0.69 |
| Transport expenses | 55.00 | 4.71 |
| Sack | 6.50 | 0.56 |
| Warehouse rent cost | 60.00 | 5.14 |
| Losses (quality loss) | 34.33 | 2.94 |
| Cleaning and Packaging cost | 92.00 | 7.88 |
| Inbred maize line seed purchasing cost | 27.31 | 2.34 |
| Chemical fumigation | 15.17 | 1.30 |
| Perdiem | 20.00 | 1.71 |
| Salary | 48.00 | 4.11 |
| Interest cost | 39.40 | 3.37 |
| Total cost | 1167.77 | |
| ASE sales price | 1400.00 | |
| ASE Gross Margin | 650.00 | |
| ASE Net Profit | 232.23 | |

Source: ASE, 2011

Table20. Cost and Profitability of local hybrid maize seed in Cooperative union, 2011

| Cost Items | Cost (Birr/qt) | Percentage of shares from total marketing cost |
|---|---|---|
| Purchase price of Certified seed | 1400 | 97.55 |
| Loading | 3.00 | 0.21 |
| Unloading | 3.00 | 0.21 |
| Transport cost | 26.12 | 1.82 |
| Total cost | 32.12 | |
| Cooperative Union average sales price (Birr/qt) | | 1435.12 |
| Cooperative Union Gross Margin (Birr/qt) | | 35.12 |
| Cooperative Union Net Profit (Birr/qt) | | 3.00 |

Source: Damot Cooperative Union, 2011 and Merkeb Cooperative Union, 2011

Table21. Cost and Profitability of local hybrid maize seed at Primary cooperative, 2011

| Cost Items | Cost and Profitability per unit (Birr/qt) |
|---|---|
| Purchase price | 1453.12 |
| Miscellaneous costs | 0.55 |
| Total cost | 0.55 |
| Primary Cooperative average sales price | 1439.12 |
| Primary cooperative Gross Margin | 4 .00 |
| Primary cooperative Net Profit | 3.45 |

Source: Wogedad MPC, 2011 and AvolaGoshyieMPC, 2011

### 4.8.3 Computation of Total Gross Marketing Margins (TGMM)

$$TGMM = \frac{\text{End buyer price- First seller price}}{\text{End buyer price}} \times 100$$

Were, TGMM = Total gross marketing margin

### 4.8.4 Computation of Producer's Gross Margins (GMMP)

Farmer's portion or 'producer's gross margin (GMMp) which is the portion of the price paid by the consumer that goes to the producer.

$$GMMP = \frac{\text{End buyer price} - \text{Marketing gross margin}}{\text{End buyer price}} \times 100$$

Where, GMMP= the producer's share in consumer price

### 4.8.5 Computation of Net marketing margin (NMM)

Net marketing margin is the percentage of the final price earned by the intermediaries as their net income after their marketing costs are deducted. The percentages of net income, which can be classified as pure profit depends on the extension to such factors, as the intermediaries' own (working capital) cost.

$$NMM = \frac{\text{Gross margin} - \text{Marketing cost}}{\text{End buyer price}} \times 100$$

Where, NMM= Net marketing margin

### 4.8.6 Gross Marketing Margin of farmers produced hybrid maize seed

Products reach to final consumers through a market chain. In the study area there are four participants in local hybrid maize seed marketing chain, Seed producer farmers, Contractor (ASE), Cooperative Union, Primary cooperative and the ultimate seed user (the farmer). Each seed marketing chin participant performs one or more than one marketing function(S). The producer farmers transport their produce from his farm to the collection center of unprocessed seed. The contractor purchase the seed from seed producer farmers at the seed collection center, transport the seed to the center of seed processing plant, store it, clean the seed, grade the seed, treat it with chemicals, pack, label and distribute the processed seed to cooperative unions. The cooperative unions purchase the seed from seed distribution centers and transport it to the potential primary cooperative stores. The primary cooperatives distribute the seed for final seed users (farmers).

The price paid by the final consumers is thus made up of the amount of money paid out to the farmers for his produce plus all the costs involved until the produce reach the ultimate consumers. A marketing margin exists as the price difference between any stages in the marketing chain. The percentage share of final price, which is taken up by the marketing function is known as the marketing margin (Eshetu, 2004).

Based on the reported prices by the different seed market participants, summarized in (Table 17, 18, 19, 20 and 21 ),the different indicators of marketing margins for locally produced hybrid maize seed was calculated and estimated as:

TGMM (complete distribution channel) = 47.88%

GMM (Amhara Seed Enterprise) = 45.17%

GMM (Cooperative union) = 2.44%

GMM (Primary cooperative) = 0.28%

GMMP (Producer's participation) = 100%-47.88% =52.12%

Base on the result of marketing margin analysis, the seed producer farmer and Amhara Seed Enterprise (ASE) shares from the consumer price calculated as 52.12% and 45.16%, that comprises about 97.28%, which is by much greater than the share of cooperative Union 2.44% and Primary Cooperative 0.28%. In addition, the share of the Net marketing margin of the producer 66.47% is much greater than the share of ASE 32.63%. From this, one can conclude that the seed producer's shares the maximum marketing margin and the Net marketing margin of contract hybrid maize seed production and marketing arrangement. This share may contribute in increasing the income of the seed producers.

Table22. Comparison of income between one hectare of LHMSD and Grain maize in 2010

| Description | Marwoled | | | | Goshyie | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LHMSD | | | Grain maize | LHMSD | | | Grain maize | LHMSD | | | Grain maize |
| | Cross breed | Self pollinated | Total | | Cross breed | Self pollinated | Total | | Cross breed | Self pollinated | Total | |
| Average productivity qt/ha | 37.29 | 6.12 | 43.41 | 66 | 31.43 | 5.18 | 36.61 | 49 | 35.70 | 5.65 | 41.35 | 56.70 |
| Average selling price birr/qt | 750.00 | 275.00 | | 275 | 750.00 | 280.00 | | 280.00 | 750.00 | 277.75 | | 277.75 |
| Total selling price birr/ha | 27967.50 | 1683.00 | 29650.50 | 18150.00 | 23572.50 | 1450.40 | 25022.90 | 13720.00 | 26775.00 | 1569.29 | 28344.29 | 15748.43 |

**Source: Own survey result, 2011**

## 4.9 Measures of market concentration ratio (CR4)

A market concentration ratio is a measure of the percentage share of the market controlled by a specified percentage of firms ranked in order of market share from the largest to smallest (Karugia, 1990). High concentration and inequality indicate oligopolistic tendencies; while conversely, low concentration suggests tendencies towards competition provide there are no serious barriers to entry in to the market (Bain, 1951, 1968).

There are different types of hybrid maize seed (BH660) producers/suppliers/ were available in Amhara Region. At the regional level, market concentration ratio has been calculated to analyze the type of market prevailed. As Table22, clearly indicate hybrid maize seed market in the study area was weak. Because the $C_4$ measures of market concentration ratio shows that the four largest seed traders (57.14 %) of the market were controlled 89 % of the total volume of BH660 hybrid maize seed market share in 2011. This is clearly indicates that there is tight oligopoly market. This is to mean the top four seed suppliers handled 89% of BH660 hybrid maize seed market at regional level and only ASE accounted 68% of the total volume of BH660 hybrid maize seed market (CR4).

Applying the market structure criteria suggested by Kohls and Uhl(1985), the local hybrid maize seed marketing shows that strongly oligopolystic at regional market. This implies that there is market imperfection because a few suppliers seem to have monopolized the hybrid maize seed market at regional level.

Table23. Concentration ratio of BH660 at Regional market, 2011

| Number of suppliers | cumulative of traders | Amount Sold, in quintal | % share of market | %Cumulative |
|---|---|---|---|---|
| 1ASE | 1 | 34958 | 68 | 68 |
| 1Ethio.Agri-safe | 2 | 5340 | 10 | 78 |
| 1Ayehu Zingni | 3 | 3300 | 6 | 84 |
| 1 Marwoled(SPC) | 4 | 2800 | 5 | 89 |
| 1Nile | 5 | 2600 | 5 | 94 |
| 1 Bayih Mekonnen | 6 | 2345 | 4 | 98 |
| 1 Goshyie(SPC) | 7 | 880 | 2 | 100 |
| Total sales | | 52,223 | 100 | |

Source: ANRS, BOA, 2011

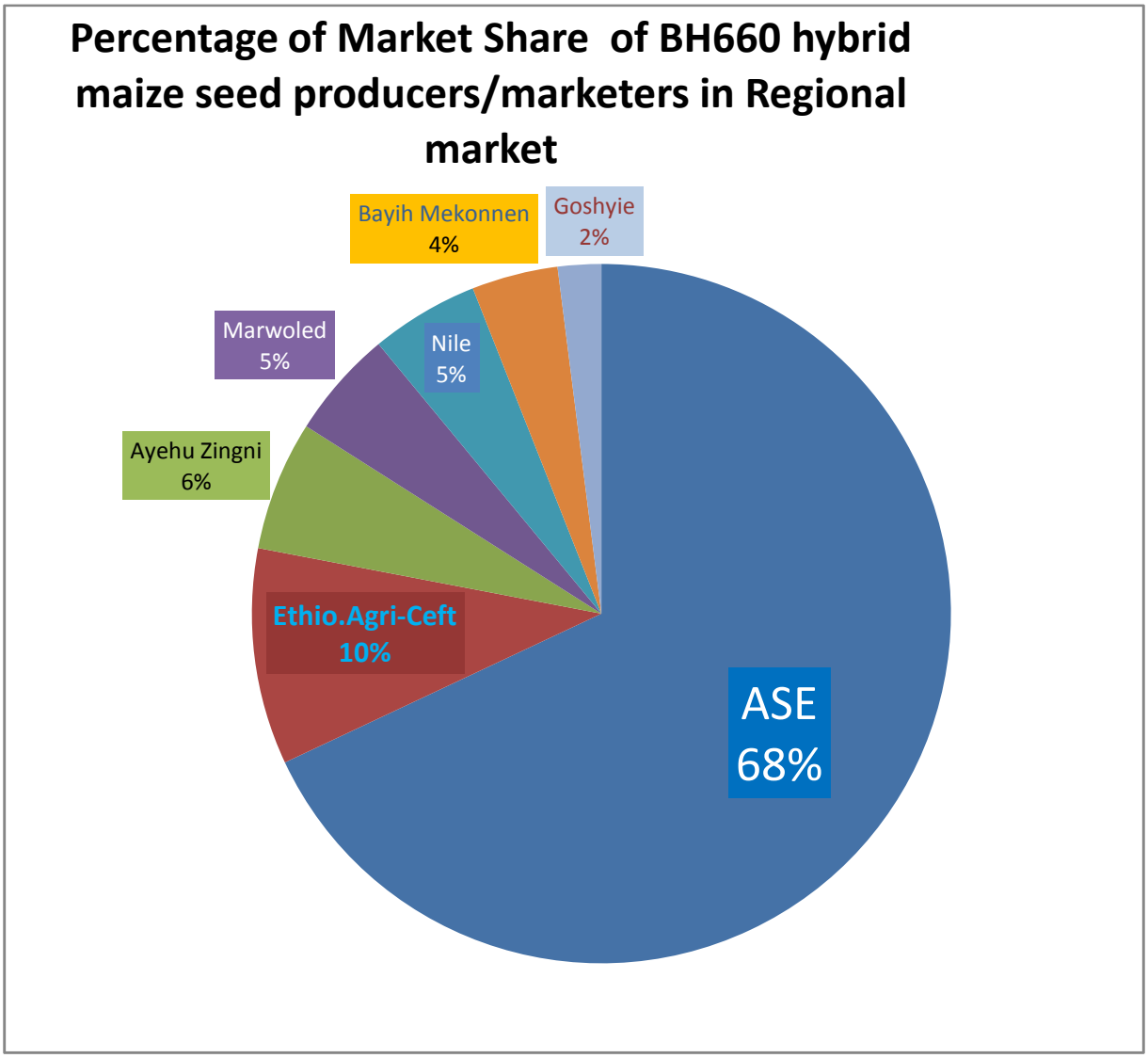



Fig7. Concentration ratio of BH660 at Regional market, 2011

Source：Source Table 23.

## 4.10 Farmers' Perception about contractual local hybrid maize seed production and marketing

The viability of contract farming depends on the satisfaction of both the seed producer farmers and the contractor, and profitability is certainly the key component for the two parties (Sriboonchitta, Songsak and Aree Wiboonpoongse. 2008). Table24, Shows that the sample households joined contractual hybrid maize seed production and marketing program for a number of reasons, the main reasons identified by the sample households in order of their importance (Table24).

1. Expectation of high returns
2. To get access of inbred maize line seed from the contractor
3. To achieve credit service for hybrid maize seed production and marketing
4. To get technical support for hybrid maize seed production

Table24. Response of households joining contract seed production

| Parameters | percentage | | |
|---|---|---|---|
| | Marwoled | Goshyie | Total |
| Contract seed production increase income | 100 | 100 | 100 |
| To get access of input (Seed) | 97.22 | 98.53 | 97.86 |
| To achieve credit access | 95.83 | 95.59 | 94.28 |
| To benefit technical support | 86.11 | 89.70 | 87.86 |

Source: Own survey result, 2011

### 4.10.1 Opinion of households on contract hybrid maize seed production increases producer's farm income

As indicated in Table25, of the total sample households 95% believed that after joining contract hybrid maize seed production and marketing arrangement their farm income/returns increased. Only 5%sample households have a low feeling towards contract local hybrid maize seed production increase the producers' income/ returns with their justification that, with the same size of land the income of pepper crop production has greater return as compared to hybrid

maize seed production. 93.06% and 97.06% 0f Marwoled and Goshyie sample households agreed that the involvement in contract hybrid maize seed production and marketing increased their farm income. The result of $\chi^2$ –value revealed that there is no significant difference between the two study areas with respect to the perception of contract local hybrid maize seed production and marketing increase producers' returns (Table25). This gives information the future to specialize local hybrid maize seed production and marketing in the study area.

### 4.10.2 Perception about level of Fertilizer utilization

Table25. shows that 95.71% of the respondents agreed that Contract local hybrid maize seed production and marketing arrangement improved the level of farm input utilization (DAP and UREA fertilizer). In addition, 98.61% of sample households and 92.65% of Goshyie the farmers in Goshyie agreed that contractual hybrid maize seed production and marketing arrangement improved their utilization of DAP and UREA fertilizer. There was no perception variation with respect to contract hybrid maize seed production and marketing arrangement improved the household level of fertilizer (kg/ha)utilization. The possible reason could be the contract agreement enforced the household to utilize the principal recommended amount of fertilizer for hybrid maize seed production.

### 4.10.3 Perception about credit service

As indicated in Table 25, 77.14% of the sample household respondents dissatisfied with access to credit service in 2010. In other words, only 22.86%and 8.57% of the respondents have positive feelings towards credit service and amount of credit supplied to purchase hybrid maize seed farm inputs. There is a significant difference between the two study sites, with respect to perceptions towards credit service at less than 5% level of significance (Table25). This implies that credit has own effect on the perception of the sample households to participate in and supply hybrid maize seed. The possible reason for variation could be Marwoled sample households have more access to credit as compared to Goshyie.

### 4.10.4 Farmers' perception towards price agreement

The survey result proved that Contract hybrid maize seed production and marketing improves seed producers' household income. Based on this fact, one would expect that most households have positive feelings on the existing price agreement of contract hybrid maize seed. This was not true in this study.

94.40 % and 77.90% of sample households of Marwoled and Goshyie were dissatisfied on the existing pricing agreement of contract local hybrid maize seed (Table25). The reason could be the wide gap between the selling price of hybrid maize seed at the producer level and the purchasing price of processed certified maize seed at consumer level. The variation could be a need of price revision on hybrid maize seed in order to sustain the contract arrangement.

### 4.10.5 Perception towards Time of payment

Table25. Shows that 81.57% of the respondents were disagree with the time of payment. This indicates that there was payment delaines in 2010. This could be the lengthy procedure of payment system of the contractor.

Table25. The household Perception

| Parameters | N=72 Marwoled | N=68 Goshyie | N=140 Total | $\chi^2$-value |
|---|---|---|---|---|
| Contract Local hybrid maize seed | | | | |
| Production increase producers' returns | | | | |
| (Agree, %) | 93.06 | 97.06 | 95 | 1.180 |
| (Disagree, %) | 6.94 | 2.94 | 5 | |
| Perception about fertilizer utilization | | | | |
| (Agree, %) | 98.61 | 92.65 | 95.71 | 7.520** |
| Perception about price of their produce | | | | |
| (Satisfied, %) | 5.60 | 22.10 | 13.60 | 8.120** |
| (Dissatisfied, %) | 94.40 | 77.90 | 86.40 | |
| Perception towards Time of payment | | | | |
| (Agree, %) | 31.94 | 4.41 | 18.57 | 17.530*** |
| (Disagree, %) | 68.06 | 95.59 | 81.43 | |
| Perception about credit access | | | | |
| (Disagree, %) | 68.06 | 86.76 | 77.14 | 6.942*** |

N=sample size, ***, ** significantly at less than 1% and 5% significance level, respectively.
Source: Own survey result, 2011

## 4.11 The constraints, opportunities and threats on hybrid maize seed production and marketing

Production, marketing and institutional constraints and opportunities in contractual local hybrid maize seed production and marketing in the study area were identified by the sample households, based on the survey result the following constraints and opportunities are summarized.

### 4.11.1 Constraints

#### 4.11.1.1 Production constraints

**Late seed supply:** Table 26, shows 65 percent of the total sample households believed that late seed supply in 2010, was one of the critical production constraints that contribute in the reduction of production and productivity of hybrid maize seed.

**Lack of provision of seed processing technology:** The respondents identified that hand threshing maintains the quality of the seed but it was a time taking and expensive activity. Table26 shows that 12.50% and 100% of Marwoled and Goshyie the sample household responds thresh their local hybrid maize seed by hand due to lack of access to seed threshing machine. Hand threshing cost more money and time for threshing. There was significant difference on access to seed thresher. The probable reason for differences in access of seed threshing machine could be the supply of seed threshing machine by the contractor (ASE) to Marwoled sample households.

#### 4.11.1.2 Marketing constraints

**Low price of locally produced hybrid maize seed:** Table26 depicts that 94.40% of Marwoled and 77.90 % of Goshyie sample households have complained with the existing price of their produce hybrid maize seed by comparing the price paid by the end user and the price paid to the seed producers. The reason could be a need of negotiation to raise the selling price of hybrid maize seed as a producer or to reduce the purchasing price of hybrid maize seed as a customer.

#### 4.11.1.3 Institutional Constraints refers to service constraints

**Lack of Fund for hybrid maize seed production and marketing:** As Table17 shows hybrid maize seed production requires about 9884.02 Birr/ha. To fulfill this amount of capital sample

respondents were in need of extra fund for hybrid maize seed production. 77.14% of the sample households indicate there was shortage of fund for hybrid maize seed production and marketing in 2010, of which 40% indicates they were enforced to reduce the size of their hybrid maize land due to lack of fund. This implies that lack of capital may limit the interest of participation in hybrid maize seed production. The result reduces the quantity production and supplied of hybrid maize seed.

**Lack of training service for seed producer farmers**: The whole sample respondents believed that training improves the knowledge and skill of seed producers in seed production and marketing that leads to increase the quality and quantity production and supply of local hybrid maize seed. Only 17.14% of the sample households got training in 2010 about seed production, including sowing, fertilizer application rouging and de-tasseling. This implies that majority of the sample households were ready to improve their hybrid maize seed production and marketing skill through training.

**Limited access to technical support:** Table 26 reveals that 80.71 percent of the total respondents indicate that limited technical support especially during the period of de-tasseling, harvesting and threshing was among the institutional constraints faced local hybrid maize seed producer farmers at the field level during 2010. This shows that hybrid maize seed producers need continuous technical support especially during the period of de-tasseling, harvesting and threshing.

**Lack of motivation and organizational support to the Seed Producers cooperative:** 92.86 percent of the respondents respond that lack of motivation and organizational support for seed producers' cooperatives was the main constraint faced local hybrid maize seed producers during 2010.This indicates that Cooperative promotion agency gave less attention to seed producers cooperatives.

Table26. Seed production and marketing Constraints

| Parameters | percentage | | | |
|---|---|---|---|---|
| | Marwoled | Goshyie | Total | $\chi^2$-value |
| **Production constraint ((Agree, %)** | | | | |
| Late seed supply | 31.94 | 100 | 65 | |
| Lack of seed threshing machine | 12.50 | 100 | 55 | 4.505** |
| **Marketing constraints (Agree, %)** | | | | |
| Low price of hybrid maize seed | 100 | 100 | 100 | - |
| **Institutional constraints (Agree, %)** | | | | |
| Lack of access to training | 72.22 | 94.12 | 82.86 | 11.803 *** |
| Lack of access to credit | 59.06 | 86.76 | 72.86 | 6.942*** |
| Limited technical support | 83.33 | 77.94 | 80.71 | |
| Limited technical support Lack of motivation and Organizational Support | 93 | 92 | 92.86 | |

N=sample size, ***and **, significantly at less than 1% and 5%, significance level, respectively.
Source: Own survey result, 2011

## 4.12. Opportunities

### 4.12.1 Production opportunity

**Increased technical experience:** Table27 shows, of the total sample households 86.56 and 77.94 percent of the sample respondents indicate contract hybrid maize seed production and marketing participation increase their technical experience. They consider this experience as an important opportunity for their future farming activity. There was no significant difference between Marwoled and Goshyie sample households with respect to contract hybrid maize seed production and marketing increase farmer's production technical experience. This implies that availability of technical experience on hybrid maize seed production and marketing could be an important input for future contract hybrid maize seed and other crop production and marketing.

**Access of long rainy season:** Womberma and Yilmandensa woreda have average annual rainfall of 1100-1430 mm and 1100-1270mm, respectively. With five to six months of distribution (WWOA, 2010 and YWOA, 2010). In addition, Goshyie has access to irrigation water for hybrid maize seed production. This access with other production opportunities implies that there is suitable environment for BH660 hybrid maize seed production.

**High productivity of BH660 hybrid maize seed**: Table 27 shows 97.22 and 98.53 percentage of Marwoled and Goshyie sample household responds believed that BH660 hybrid maize seed adapted their environment and have high productive as compared to other hybrid maize seed varieties. This could be an opportunity for the household to invest in hybrid maize seed production to increase their farm returns.

### 4.12.2 Marketing opportunity

**Access to all weather roads:** AS Table 27 depicts 93.05 and 98.53percentage of Marwoled and Goshyie sample households have opportunity to all weather roads. This could be an opportunity to get technical support on hybrid maize seed business.

**High demand of the produce:** All the sample respondents believed that BH660 hybrid maize seed has high market demand in their surroundings. This is due to the short replacement period of the seed nature. The seed producer considers it as an important marketing opportunity (Table 27).

### 4.12.3 Institutional Opportunity

**Access to Extension service:** As Table27 Shows, all the respondents indicate access to extension service is an opportunity to access information about hybrid maize seed technology and marketing. That helps to improve the production and productivity of hybrid maize seed and other agricultural activities.

Table27. Seed production and marketing opportunity

| Parameters | percentage | | |
|---|---|---|---|
| | Marwoled | Goshyie | Total |
| **Production opportunity (Agree, %)** | | | |
| Increased technical experience | 86.56% | 77.94% | 82.12 |
| High productivity of BH660 | 97.22% | 98.53 | 97.86 |
| **Marketing Opportunity (Agree, %)** | | | |
| Access to all weather roads | 93.05% | 98.53% | 95.71 |
| High market demand of BH660 hybrid maize seed | 100 | 100 | 100 |
| **Institutional opportunity (Agree, %)** | | | |
| Access to extension | 100 | 100 | 100 |

Source: Own survey result, 2011

### 4.12.4 Local hybrid maize seed production and marketing threats

Of the total sample respondents, 90 percent of the sample respondents, the result of focus group discussion and informal discussion shows the existing contract hybrid maize seed production and marketing arrangement has a strong threat especially poor seed quality inspection system during de-tasseling, harvesting and threshing and uniform pricing of different grades of locally produced hybrid maize seed will affect the quality of community-based hybrid maize seed. They indicate that this may cause for the seed producers to loss the market demand of their hybrid maize seed in the near future.

# Chapter V: Summary, Conclusions and Recommendations

## 5.1 Summary

This study was conducted to analyze the performance of hybrid maize seed production and marketing, constraints and opportunities in Wombera and Yilmanddensa woreda, Amhara National Regional State.

To carry out this research, two woreda and Hybrid maize seed variety ($BH_{660}$) were selected purposively based on the interest of the researcher and discussion with professionals. Then from each woreda one seed producer's cooperative were selected purposively, based on their involvement in hybrid maize seed production and marketing. From the two seed producer's cooperatives a total of 140 sample respondents were randomly selected for interview. In addition to interview of sample farmers, 4 focus group discussions with key informants were carried out using checklist and different qualitative information were collected during surveying and quantitative information were collected from different organizations and professionals in order to have clear idea of the situations.

In order to describe and analyze different categories of the sample units with respect to the desired characteristics, mean, standard deviation and percentage were computed. Furthermore; t-test and chi-square test were used to testify the significance of the results obtained from the models specified.

Linear regression model was employed to analyze significant variables that influence the quantity supply of hybrid maize seed. As summarized from econometric analytical results, there are different variables that determine the quantity supply of local hybrid maize seed, which can be categorized as demographic, socio-economic and institutional factors. From hypothesized variables to influence the quantity supply of local hybrid maize seed: Amount of UREA fertilizer utilization, Access to credit, Contract farming experience of the household and Time of seed supply were significantly and positively influence the quantity supply of hybrid maize seed in the study area.

The performance of local hybrid maize Seed Production and Marketing also analyzed by different conditions which may come across at each level of the seed marketing system. Seed processing cost, Transport cost and warehouse cost were identified as the major cost components of hybrid maize seed marketing, which accounted 19.89%, 19.34% and 12.97%, respectively and accounted about 52.20% from the total marketing cost. This is because the distance of the seed processing plant far from hybrid maize seed production sites and from the potential hybrid maize seed users. In addition, the warehouses are situated at BahirDar city; it increases the cost of storage. The performance of marketing for locally produced hybrid maize seed measured using GMM and NMM distribution amongst the seed marketing participants. The gross marketing margin analysis result proved that GMM and NMM share of local hybrid maize seed producer, the contractors, Cooperative union and Primary cooperative were 52.12% and 65.76%, 45.16% and 33.31%, 2.44% and 0.28% and 0.50% of the consumers' price, respectively. From this one can conclude that producer's gain the highest GMM and NMM share of the consumer's price. Therefore, participation in contract hybrid maize seed production and marketing increase the gross returns and net income of the seed producer that they would get from the same size of land on which they have been producing grain maize for open market. The hybrid maize seed marketing concentration ratio indicates that inefficient at regional level and characterized by oligopolistic market.

The performance of local hybrid maize seed production and marketing was measured also based on the perception of the seed producers with respect to Socio-Economic impact. Based on their perception 95% and 79.29% of sample contract hybrid maize seed producers perceived positively that contract local hybrid maize seed production and marketing increase the income of seed producer farmers' and they believe that contract hybrid maize seed production and marketing play significant role in experience development and technology transformation. However, sample hybrid maize seed producers disagree with the existing price of their hybrid maize seed and Time of payment.

Lack of provision of seed processing technology and late seed supply, low price of hybrid maize seed, lack of fund, lack of training limited technical support and lack of motivation were identified as production, marketing and institutional constraints that limit the participation of the house hold in quantity supply of hybrid maize seed.

Increasing farmers' technical experience, High adaptability and productivity of the variety ($BH_{660}$), Long rain season and accessibility of irrigation water, Existence of sustained demand of the produce(due to short replacement period of the seed nature), Accessibility of all weather roads and Access to extension contact service were identified as existing opportunities for local hybrid maize seed production and marketing.

## 5.2 Conclusions

The major findings of this study include the contribution of socio-economic and institutional factors in the performance of hybrid maize seed production and marketing in the study area.

1. Amount of UREA fertilizer, Access to credit, Contract farming experience of the household and Time of seed supply were significantly and positively influence the quantity supply of hybrid maize seed in the study area.

2. Marketing margin and net marketing margin Share of Seed producer farmer in contract hybrid maize seed production and marketing was found 52.12% and 65.76%, respectively. This indicates that the seed producer gain highest share from consumers price. Based on this participation in contract hybrid maize seed production and marketing increase the gross returns and net income of the seed producer.

3. The major cost components of hybrid maize seed marketing in 2010, was identified as Seed processing, Transport and warehouse costs accounted 19.89%, 19.34% and 12.97%, respectively and about 52.20% of the total marketing cost.

4. The major cost components of hybrid maize seed Production in 2010, was identified as land leased-in and input cost (Fertilizer cost) comprise 27.21% and 24.41% of the total production cost, respectively. This cover about51.62% of the total production cost.

5. Hybrid maize seed marketing (BH660) concentration ratio at regional market indicates that inefficient characterized by oligopolistic market.

6. Based on the result of respondents perception rank the households joining contract hybrid maize seed production and marketing arrangement with the expectation of contract seed production increase farm income, to get input(seed) access, to achieve credit access and to benefit technical support

7. Based on contract hybrid maize seed producers' perception 95% and 79.29% of the total sample contract hybrid maize seed producers perceived positively that contract local hybrid maize seed production and marketing increase the income of seed producers and it plays significant role in experience development and technology transfer among participants. On the other hand, the result of respondents perception rank indicates 86.40%, 81.43% and 77.90 % of sample Seed households were not satisfied with existing selling price of locally produced hybrid maize seed, Time of payment and access of credit, respectively.

8. Lack of provision of seed processing technology and late seed supply; Low price of local hybrid maize seed, lack of fund; Lack of training, limited technical support and lack of motivation were identified by the respondent as production, marketing and institutional constraints that limit the participation of the house hold in production and quantity supply of hybrid maize seed.

9. Increasing farmers' technical experience, High adaptability and productivity of hybrid maize seed variety ($BH_{660}$), Long rain season and accessibility of irrigation water; Existence of high and sustained demand of the produce(due to short replacement period of the seed nature), Accessibility of all weather roads. And Access to extension service as existing opportunities for local hybrid maize seed production and marketing.

10. Poor Seed quality inspection and management system and uniform pricing for different grades of hybrid maize seed identified as a major threat on community-based hybrid maize seed production and marketing in the study area.

## 5.2 Recommendations

Seed producers' cooperative (SPC) members play an alternative role in supplying of hybrid maize seed in Amhara Region. Community-based hybrid maize seed production and marketing

has paramount importance for seed producer farmers and seed users in satisfying the seed demand of subsistence farmers. Moreover, local hybrid maize seed production can be considered as a means to generate reliable income, transformation of new and better farming skill and plays an alternative to specialize on as an income generating activity for hybrid maize seed producer farmers. To mitigate the existing local hybrid maize seed production and marketing constraints and to sustain the benefits of local hybrid maize seed production and marketing in the study area, the following points are recommended:

1. Contract Local hybrid maize seed production and marketing is a promising means of increasing the productivity of maize and the returns of the seed producers. It plays important role in the transformation for agro-industry development in Ethiopia in general and in the study area in particular. However, Production and marketing of hybrid maize seed is a complex process involving several steps including product development, testing, seed production and marketing. Therefore, it involves the interaction of several sectors and actors in the study area, designing of measures needs to take in to account the existing local, social, economic, institutional and environmental opportunity and potentials. The partners and local agencies should coordinate themselves and design effective communication system to facilitate, guide and develop the capacity of the seed producers' and seed traders in order to use the existing opportunities appropriately to achieve efficient result from community-based hybrid maize seed production and marketing.

2. Seed producers' cooperatives have been a successful means for market participation of subsistence farmers in organized way and it is encouraging for farmer's capacity building in production, marketing and technology transfer. Therefore the seed producer's needs to: facilitate their bargaining power, to play their roles in reduction of long seed marketing channels to reduce seed marketing costs and create competitive market for hybrid maize seed at Local, Regional and National market. Therefore, Cooperative Promotion Agency should give attention in technical support for organizing and strengthening of the seed producers' cooperatives to improve their participation at different levels of seed producers' cooperatives.

3. Time of seed supply is a critical factor for hybrid maize seed production and quantity supply. Seed supply should fit with the planting time of hybrid maize. Therefore, the seed supplier (ASE) should have appropriate plan to supply the seed for hybrid maize seed producer farmers and the partners should devise other alternative sources of inbred maize line seed for farmers.

4. Principally recommended utilization of chemical fertilizer for hybrid maize seed production has significant effect on the quality and quantity production of hybrid maize seed. On the other hand, out of the total production cost, fertilizer cost comprises about 24.41% in 2010 production season and the current price of chemical fertilizer is increasing. Therefore, the agricultural extension service should give attention to the utilization of the recommended amount of commercial fertilizer combined with organic fertilizer to maintain and increase the quality, productivity and quantity production and supply of hybrid maize seed.

5. Seed processing, Transportation and Warehouse costs contributes about 52.20% of the total marketing costs of hybrid maize seed. These plays significant role in elevating the marketing cost of hybrid maize seed as a result the purchasing price of hybrid maize seed for the final users becomes high, to make the price of hybrid maize seed affordable to the ultimate seed user it is advisable that hybrid maize seed processing activities and seed warehouse service should be planted at the center of potential hybrid maize seed producers and potential hybrid maize seed users. This can be achieved through the participation of agricultural cooperatives unions by planting medium scale seed processing plants and construction of safe seed storages.

6.The fundamental responsibility of seed producer farmer's is production of quality seed and the contractors, seed traders, quality inspectors and seed users are liable to maintain the quality of hybrid maize seed. To achieve standard quality of hybrid maize seed; all participants involved in hybrid maize seed production and marketing should give prior attention to seed quality. The partners have a responsibility in skill training, experience sharing, technical support, close supervision, continuous monitoring and well organized quality inspection and control of the seed actors in an organized system.

**7.** Seed quality is a fundamental and primary issue for all seed business participants. Quality based seed pricing strategy encourages and promotes quality hybrid maize seed production and marketing system and it helps to facilitate fair competition within the seed producers and traders. Therefore, design different grade based seed pricing strategy and improves the existing seed quality inspection system to minimize the threats of seed producers' in relation to quality hybrid maize seed production and marketing and it assists to maintain the quality of hybrid maize seed. This would be attained through effective coordination of seed producers, contractors, cooperatives, partners and seed users.

8. Hybrid maize seed production and marketing is a capital-intensive business. Access to finance is vital to develop the performance of community-based hybrid maize seed production and marketing. Therefore, responsible organizations provide technical support and encourage rural financial institutions to play their role in credit provision for seed producer's cooperative members in accessible way with affordable interest rate.

9. To alleviate the problem of seed threshing machine and to encourage local hybrid maize seed production, the Seed Producer's Cooperatives should buy the seed threshing machine and provide service to their members with affordable cost in order to save the time, labor and money of their members.

10. To promote the sustainability of contract hybrid maize seed production and marketing the term of agreement should be participatory and comprehensive and should be performed in accordance with the signed agreement. The term of contract agreement should be revised with full participation of the contracting parties. This also increases the trust between the producers and the contractor.

11. Hybrid maize seed is a high-value and perishable commodity and requires insurance. Therefore, it is advisable that hybrid maize seed producers, contractor and seed traders should devise crop insurance mechanism to reduce the possibilities of seed production and marketing risks.

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# Appendix

## Interview schedule

This interview schedule is prepared to collect data from local hybrid maize seed producers' cooperative members/farmers for the purpose of comparative analyzing of the performance of local hybrid maize seed production and marketing arrangement in Wonberma and Yilmana Densa woreda, Amhara Rregion, Ethiopia. This interview schedule will use for academic purpose only. Therefore, I will keep the information confidentially and will not transfer to third party without prior consent of you.

### A. Survey Questionnaire

### 1- General Information

1.1 Research Site: Region _____ Zone _____ Woreda _____Seed producer Cooperative_____ PA _____ Village/Got _____

1.2 Interviewer/Enumerator full name: _____ Signature _____

Date of Interview _____

1.3 Respondent identification number _____/Use **01** for Local hybrid maize seed producers, **02** for hybrid maize seed users (customers)/

1.4 House-hold Head: a) Full name---------- b) Sex: male=1 female=0

c) Age: ___ (completed years)

d) Marital Status: _____ married=1 single=2 divorced=3 widowed=4

1.5 Family Size in Sex, Age, Education and (including the household head), Relation to household head, and Main occupation

Table 1

| No | Name of household member (1) | Sex | | Children (< 15 years) (4) | 15-65 years (5) | >65 years (6) | Educational level (7) | Relation to house hold head (8) | Main occupation (9) |
|---|---|---|---|---|---|---|---|---|---|
| | | Male (2) | Female (3) | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

**Code for (7)**

- Illiterate =1

- Read a letter and write (including religious education) =2
- Attending primary school completed grade (1-4)= 3
- Primary school completed grade (5-8)= 4
- Secondary school completed (9-12)=5
- Higher education completed (diploma and above)=6

**Code for (8)**

- Son/Daughter=1
- Wife/husband=2
- Parent=3
- Relative=4
- Employee=5
- Others =6 specify----------

**Code for (9)**

- Farming=1
- Animal rearing=2
- House work=3
- Student=4
- Handicraft including Weaving/spinning/pottery=5
- Others =6 specify----------

1.6 For how long do you have been working in farming? _____years

1.7 For how long do you have farming for your own? _____years

1.8 Have you participated in some formal social organizations (responsibility) in your Kebele/Pa? cooperative? Yes=1 No= 0

1.9 If yes, what was/were your responsibility? Kebele/PA executive member=1 Cooperative executive member=2 Woman's association=3 Youth association=4 Water user's group=5

Religious leader church/mosque =6 other = 7 (specify) _____

1.10 Were you a member of any community-based traditional institutions? During or before 2010 Yes=1 No=0

1.11 If Q.1.10 is yes, in which institutions were you a member? Idir=1 Ekob=2

Mehaber=3 others=4 (specify) ----------

**2. Farm characteristics**

**Land**

Provide the following information about your all land holdings for 2010 (both owned and non-owned) in hectares

2.1 How much is your farm size in hectares (own land)?

Wet land (irrigation) ----------ha

Dry land----------ha

Total farm size ----------ha

2.2 Provide the information on the area covered and the yield obtained from the crops cultivated in 2010

Table 2

| No | Crops types | Land (ha) | Total Yield (qt) | Price (birr/qt) | Total value |
|---|---|---|---|---|---|
| 1 | Tef | | | | |
| 2 | Maize | | | | |
| 3 | wheat | | | | |
| 4 | Barely | | | | |
| 5 | Finger millet | | | | |
| 6 | Fababean | | | | |
| 7 | Field Bean | | | | |
| 8 | others | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

2.3 Have you rented in/shared in some one land in 2010 production season? (Circle).

1. Yes 2. No

2.4 If question 2.3 is yes, what was the size of the land rented in? ----------ha

2.5 If question 2.3 is yes, what was/ were the reason/s for renting in/ sharing in? (Circle)

1. Because of land shortage

2. Because of extra labor force I had

3. Availability of fertilize, improved seed and other inputs

4. Other /specify----------

2.6 If question 2.3 is yes, type of agreement? (Circle)

1. in birr

2. in grain

3. Both in birr and grain

2.7 If it was in birr. How much it was? ----------birr

2.8 If it was in grain, how much was the share? (Circle)

½(equal) =1 1/3rd =2 2/3rd =3 1/4th =4 5.others/specify-----

2.9 How much was your hybrid maize seed farm size in hectare/Timad during 2010 production year? ----------ha/Timad

2.10 How do you compare your local hybrid maize seed production farm size during the previous years? (Circle)

Increase=1

Decrease=2

Same/equal=3

2.11 If the farm size is increased what was the probable reason(s)? (Circle)

1. Availability of farm inputs/ chemical fertilizer, Inbred maize line seed,

2. Availability of excess labor

3. Availability of credit

4. Profitability of seed production

5. Favorable contractual agreement

6. Other specify

2.11. If the farm size is reduced /decreased, what was the possible reason(s)? (Circle)

1. Shortage of supply of inbred maize line seed (lack of timely and sufficient supply)

2. Shortage of supply of other farm inputs (fertilizes)

3. Limited labor

4. Lack of finance for seed production

5. Dissatisfied with contractual seed production agreement

6. Lack of market for your product (hybrid maize seed)

7. The price of inbred maize line seed was high

8. Other/specify----------

## 3. Access to inbred maize line seed

3.1 Where did you get your inbred maize line seed in 2010 production year? (Circle)

ASE/ESE=1

ARARI=2

BOARD=3

Others/specify=4

3.2 How did you get the inbred maize line seed? During 2010(circle)

Purchase=1

Loan/credit=2

Gift=3

Barter=4

Other =5specify----------

3.3 If you got on purchase, how much was the price of the inbred maize line seed? ----------birr per kg.

3.4 Did you get the required **type (variety**) of seed in 2010?

Yes =1 No=2

3.5 Do you get the required **quantity** of seed in 2010?

Yes =1 No=2

3. 6 Do you get the required **quality** of seed in 2010?

Yes=1 No=2

3.7 Do you get the required type, quantity and quality of seed on **time** in 2010?

1. Yes 2.No

3.8 Did you observe any problem in getting inbred maize line seed? If any state

1. Quality problem

2. Quantity of supply problem

3. Timely supply problem

4. Required variety (Type) supply problem

3.9 Due to the above problem did you lost any economic benefit? Specify----------

---

---

3.10 What measures to be taken to mitigate the above problem?

1. Quality problem ----------

2. Quantity of supply problem ----------

3. Timely of supply problem----------

4. Supply required variety problem----------

## 4. Input Used in 2010 production season for Hybrid maize seed production

4.1 How much kg of inbred maize line seed did you use during 2010? ----------kg

4.2 How much kg of DAP fertilizer did you use for hybrid maize seed production during 2010? -------kg

4.3 How much was the cost of DAP fertilizer ----------birr per quintal

4.4 How much kg of Urea fertilizer did you use for hybrid maize seed production during 2010------kg

4.5 How much was the cost of Urea fertilizer during 2009/10 production season? ----------birr per quintal
4.6 How much liters/kg of pesticide/herbicide did you use to produce hybrid maize seed during 2009/10 production season? ----------
4.7 How much was the cost of pesticide/herbicide? Birr Per liters----------, birr per kg-------

## 5. Input Used in 2010 production season for Grain maize production

5.1 What was the size of your maize farm in ha in 2010 crop season? ----------ha

5.2 How much kg of hybrid maize seed did you use in 2010? ----------Kg---------ha

5.3 How mach kg of local maize seed did you use in 2010? (Local maize seed includes F2 generation of hybrid varieties of maize, indigenous maize seed) ----------kg-------ha

5.4 If you used local variety, what was the reason?

Shortage of hybrid maize seed=1 price of hybrid maize seed was high=2 lack of timely supply of hybrid maize seed=3 lack of credit to purchase hybrid maize seed=4 cost of local seed was cheap=5 other =6 specify

5.5 If you used local maize seed, where did you get the seed? Own previous harvest-----kg,

Gift from relatives------kg, borrowing---------kg, from local market--------kg, bartering-----kg

5.6 If bartering took place, which crop by local maize seed? ----------, and what was the proportion of exchange? ----------

5.7 If you bought from local market, how much was the price of local maize seed in kg during 2010? ----------birr/kg

5.8 How mach kg of DAP fertilizer did you use for grain maize production in 2010? -------Kg

5.9 How mach kg of Urea fertilizer did you use for grain maize production in 2010? -------Kg

5.10 How mach liters/kg of pesticide /herbicide did you use for grain maize production in 2010? -------Kg

5.11 What was the price of grain maize per kg during 2010? ---------birr

## 6. Amount of hybrid maize seed produced and marketed

6.1 How much quintals of hybrid maize seed did you produce during 2010 ----------quintals

6.2 To whom did you sell the hybrid maize seed you produce in 2010?

1. to your contractor----------quintal(S)

2. The price of your hybrid maize seed ----------birr/quintal

3. to seed producer's cooperative(s) ----------quintals

4. The price of your hybrid maize seed ----------birr/quintal

5. to local market for seed----------quintal(S)

6. The price of your hybrid maize seed ----------birr/quintal

7. Use for own seed consumption----------kg

8. Use for own grain consumption----------kg

9. to local market for consumption---------- quintal(S)

10. The price of your hybrid maize seed----------birr/quintal

## 7. Information on the experience of the household on contract farming

7.1 Have you ever participated in contract farming in any crop/livestock production before 2010? (Circle) Yes=1 No=0

7.2 If yes, why? (Circle)

Appreciating its benefit=1

Forceful measure of the state=2

To get inputs easily=3

Others= 4 (specify)_____

7.3 If yes, for question 56, in what types of crop/livestock production did you take the contract(s) and when? Crop/livestock types _____ name of the contractor _____ Crop year_____

7.4 When did you start local hybrid maize seed production in contract? 200----------

Variety of maize seed----------

7.5 What is/are the reason(s) for participating in local hybrid maize seed production in contract farming? **Multiple answers is possible** (Circle)

Market access for input =1

Price protection=2

Credit support=3

Technical and extensions services=4

Guaranteed markets for output=5

Increased competitive edge=6

Guaranteed stable income=7

High quality produce=8

Others=9specify----------

## 8. Information about Access to Extension Service

8.1. Did you have extension contact in relation to hybrid maize seed maize production in 2010 cropping season? (Circle)

Yes=1 No=2

8.2 If yes, how often the extension agent contacted with you? _

Weekly =1 Once in two weeks=2 Monthly =3 every three month=4 every six month=5 once a year=6

8.3 What was the extension advice on?

Seed bed preparation=1 planting=2 fertilizer applications=3 Weed control =3 de-tasseling=4 Post harvest handling=5 chemical applications=6 marketing=7 other= 8(specify) ---------

8.4 Have you ever heard about contract farming? Yes= 1 No=0

8.5. If yes, from whom/where did you heard about contract farming for the first time?

DAs=1 neighbors=2 farmers organizations (SC, PA) =3 Radio=4 written documents= 5 others=6 (specify) _____

8.6 Have you ever prepared a field demonstration-day on hybrid maize seed production? Yes=1 No=0

8.7 Have you ever attended a field day(s) on demonstration trial(s) of on hybrid maize seed production? Yes= 1 No=0

**9. Information about Access to credit service**

9.1 Did you take any credit for the production of contracted hybrid maize seed in the production year of 2009/10 from any formal creditors? Yes=1 No=0

9.2 If yes, what types of formal credit did you take in 2010 crop year? Cash form=1 fertilizer form=2 hybrid seed form =3chemical form =4others=5 (specify) _____

9.3 If yes, what were the main sources of your formal creditors? Bank=1 cooperative=2 Contractors=3 merchants =4others =5(specify) _____

9.4 Averagely, how long does it take you (on walk, one way) to reach to your formal creditors? ____hours

9.5 Did you use any credit from informal sources for hybrid maize seed during 2010? Yes=1 No=0

9.6 If yes, what were the main sources of the informal credit? Family's=1 friend's =2 local lenders=3 merchant =4others =5(specify) _____ _____ _____

9.7 If you used any credit types, provide the following information about the sources/suppliers of credit, the amount and interest rate of the credit given to hybrid maize seed production for the year of 2010?

Table 3

| Item | Creditor/ Supplier(source of finance) | Quantity (loan amount) | Length of loan (days) | Interest Rate (%) | Unit cost (birr) | Total interest (birr) | Remark |
|---|---|---|---|---|---|---|---|
| Formal source creditors | | | | | | | |
| For improved seed | | | | | | | |
| For fertilizer | | | | | | | |
| | | | | | | | |
| Informal source creditors | | | | | | | |
| For improved seed | | | | | | | |
| For fertilizer | | | | | | | |
| | | | | | | | |

.

9.8 Did you face any problem in the process of obtaining credit? Yes=1 No=0

9.9 If yes, what was/were the types of your credit problem (s)? Lack of formal creditors=1

Fewer formal creditors'=2 inadequacy of credit=3 unfavorable repayment time=4

Lack of informal creditors=1 fewer informal creditors=2 too high interest rate=3

Others (specify) _____ _____ _____

9.10 Did you pay the credit on time? Yes=1 No=0

9.11 If yes, what were the sources? Crop sales=1 livestock sales=2 livestock product sales=3

Borrowing from friends relatives=4 borrowing with interest rate=5 others=6 (specify) ----------

---

9.12 If no, what were the causes of non-repayment of the loan on time? Extended family obligation=1

Natural disaster (drought, high rainfall, hail, pest, etc) =2 limited marketing opportunities=3

Low price of output =4 lack of knowledge of credit utilization=5 inappropriate repayment time=6

Others =7(specify) _____ _____ _____

## 10. Access to training participation

10.1 Did you obtain any training program about Hybrid maize seed production on contract farming? before 2009/10 production season? (Circle) Yes=1 No=0

10.2 If not for question 10.1, why? (Circle) Unawareness=1 not convinced on benefit=2 poorness=3

Farness from training center=4 others=5 (specify) ----------

---

10.3 If yes for question 10.1 by whom the training been given? (Circle) DAs=1 woreda agricultural office=2 woreda cooperative promotion office=3 trained farmers=4 multipurpose cooperative=5 PAs=6 Agricultural research institute =7 University researchers=8 contractor=9 others=10(specify) ----------

---

10.4 If yes for question 10.1 for how many days you trained? ----------

10.5 What was the training content? (**Multiple answers is possible**)

About hybrid maize seed production=1 seed processing=2 seed storage=3 seed marketing=4 other =5 specify

10.6 Do you think that the training was adequate for your hybrid maize seed production activity? Yes=1 No=2

10.7 If your answer is No for question N$^{o}$10.6, on which activity do you require extra training for the future? ----------

10.8 Did you participate in local hybrid maize seed contract farming during 2010? Yes=1 No=0

10.9 If yes, for question 10.8 why? (Circle) To avert price fluctuation=1 appreciating its benefit=2 to easy access to inbred maize line seed =3 forceful measure of the state=4 others=5 (specify) ----------

---

10.10 If no, for question 10.8 why? Unawareness=1 not convinced on benefit=2 poorness=3

Farness from seed center=4 others=5 (specify) _____ _____ _____

**11. Access to Seed processing Technologies/Equipments**

11.1 How did you harvest your hybrid maize seed? By hand=1 by machine=2 other=3 specify

11.2 How did you remove the shield of your hybrid maize seed? By hand=1 by machine=2 other =3 specify

11.3 How did you thresh your hybrid maize seed? By hand=1 by machine=2 other=3 specify

11.4 If your answer from question 11.1-11.3 is by hand, what was the reason? To maintain the quality of the seed =1 lack of access to seed processing technologies=2 lack of skill to operate the available seed processing technology (ies) =3 other=4 specify----------

11.5 If seed processing technology is not available and you are interested to use it, what do you suggest for the future? And how?----------

---

11.6 How did you sell your hybrid maize seed during 2010 production year?

At raw =1 after processed= 2 other form=3 specify

11.7 You sold at raw form, what was your reason? Lack of processing technology=1 enforcement of the contractual agreement=2 your interest=3 lack of technical skill=4other= 5specify----------

11.8 You sold at raw form what benefit did you loss? ----------

**12. Seed quality information**

12.1 How was the Physical quality of your hybrid maize seed used in 2010? Freedom from undesired materials and broken (%)

70-79%=1 80-89%=2 90-96%=3 97-99%=4

12.2 How was the physiological purity of your hybrid maize seed used in 2010? Germination%

70-79%=1 80-89%=2 90-96% =3 97-99%=4

12.3 How was the Genetic purity of your hybrid maize seed used in 2010? Varietal purity (%)

70-79%=1 80-89%=2 90-96%=3 97-99%=4

12.4 What are your criteria to judge good quality of hybrid maize seed? Specify

1. ----------

2. ----------

3. ----------

4. ----------

## 13. Storage information

13.1 Was the hybrid maize seed produced in 2009/10 stored prior to selling? Yes=1 No=0

13.2 If yes, for how long did you store it? _____months

13.3 If yes for question 1, where did you store the crop before selling? - In house floor=1, in private rented facility=2, in own storage facility (in pit, barrel, sacks/fertilizer bags, modern storage facilities) =3, in cooperative warehouse=4, in other public/NGO facility=5, others= 6 (specify) ----------

13.4 If you used non-owned storage facilities, in what basis did you use these storages? Renting=1 freely=2

13.5 If renting, provide the following information.

Table 4

| Items | Cost of the rent | | | Remark |
|---|---|---|---|---|
| | ------/days or months or year | Unit cost | T/cost (b*c)=d | |
| a | b | c | d | e |
| storage | | | | |

## 14. Packaging and Labeling information

### 14.1 Packaging

14.1.1 What was the packaging material for hybrid maize seed in 2010 crop season? _
Sisal sack/ 'tecka'=1 Plastic sack 'Madaberya' =2 Sisal sack 'jonia'=3 others =4(specify) ------

14.1.2 How many kg of hybrid maize seed was packed in one package during 2010 crop season (minimum) ----------kg

(Maximum)----------kg

14.1.3 What is your preference of packaging weight in kg? (**Multiple answers is possible)** in order of importance

0.5kg=1 1kg=2 2.50kg=3 5kg= 4 6kg=5 10kg=6 12.5kg=7 others=8 specify

14.1.4 What is your reason to prefer----------kg package?

1. ----------
2. ----------
3. ----------

14.1.5 What is your preference of hybrid maize seed packaging material? **(Multiple answers is possible)** in order of their importance

Sisal sack/ 'tecka'=1 Plastic sack 'Madaberya' =2 Sisal sack 'jonia'=3 others =4(specify) ------

14.1.6 What is your reason to prefer the above packaging material?

1----------
2----------
3----------

**14.2 Labeling**

14.2.1 Did the hybrid maize seed you produce in 2010 crop season labeled (labeling includes: variety, germination%, moisture content in%, production date, producer's name, production site, Dressing date)? Yes=1 No=2

14.2.2 If your answer for question Nº 14.2.1 is no, what was the reason? Lack of technical skill=1 lack of labeling equipment/technology=2 lack of interest=3 enforcement of the agreement =4 other =5 specify

14.2.3 If your answer for question No 14.2.1 is no, what do you recommend for the future? ----------

14.2.4 If your answer for question No 14.2.1 is yes, what benefit did you achieve? (Multiple answer is possible) increase income=1 increase social value on the customers/seed users and increase Nº of customers and their satisfaction=2 increase technical skill=3 other =4 specify----------

**15. Marketing**

15.1 For how long it takes to reach to the nearest market from home (in walking hour, for one way)? _____ Hour

15.2 How often do you go to the nearest town? Everyday=1 3-6 days/week=2
1-2 days/week=3 once every two weeks=4 once every month=5 others=6 (specify) _____

15.3. What mode of transport do you usually use in visiting the nearest town? On foot=1 public transport=2 by pack-animals=3 others=4 (specify) _____ _____

15.4 Where did you often go to sell and purchase the agricultural inputs and produces?
Village=1 market=2 cooperative office=3 other=4specify----------

15.5 How long does it take you (on walk, one way) to reach to (in hour)? all weathered road _____ hr, Cooperative----------hr, flourmill----------hr, nearby markets ____ hr, town markets-------hr

15.6 To whom do you mostly sell your hybrid maize seed product? Contractor=1 retail traders=2 wholesalers=3 state trading companies= 4 cooperatives=5 other farmers for seed r= 6 Consumers=7 others=8 specify _____

15.7 Did you get and follow price, supply and demand information from DA? Yes= 1 no=0

15.8 What others means's did you use to get market information in addition to DA?
No effort to get information=1 radio=2 leaflets/brochure=3 cooperative=4
PAs=5 youth association=6 Women association=7 governmental offices=8
Input supplier=9 friends/relatives=10 research institute=11 University=12 ASE=13

Personal observation=14 speaking with other farmers=15 speaking with traders/regular customers=16 others=17 (specify) _____ _____

15.9 How did you qualify your source of information?

It was reliable=1 it was timely=2

It was adequate=3 It was cheap=4 other =5(specify) ----------

15.10 What were the major problems in hybrid maize seed marketing in your area in 2010 crop year?

Lack of marketing information=1 Lack of road/transport=2 lack of market places=3 low purchasing power of the people=4

Low buyers and sellers=5 lack of storage facilities=6 low output price=7 high transport cost=8 others= 9 (specify) _____ _____

15.11 How did you solve these marketing problems? Using contract farming=1 forming group association=2 selling to cooperative=3 selling the product with low prices=4

Storing of the product till good market=5 others=6 (specify) _____

**16. Price and Farm land Decision**

**16.1 The hybrid maize seed purchasing price decision**

16.1.1 Who set your purchasing price of hybrid maize seed in 2010?

Myself =1 the contractor (ESE/ASE) =2 Negotiation between Me and the contractor/ESE/ASE=3 by the market=4 I don't know=5 other=6(specify) ----------

16.1.2 If you decided on the purchasing price, how did you set the price?

Individually=1 collude consultation with other hybrid maize seed producers= 2 through their representative leaders=3 other=4 (specify) ----------

16.1.3 When did the purchasing price of inbred maize line seed set?

One month before the planting day =1 one week before the planting day=2 one day before the planting day=3 on planting day=4 after planting day= 5 other=6 specify----

16.1.4 Based on the decision of your purchasing price of hybrid maize seed what benefit(s) you achieve? ----------

16.1.5 based on the decision of your product price what benefits(s) you lost----------

16.1.6 Based on the time of your purchasing price decision what benefit(s) you achieve? ----------

16.1.7Based on the time of your purchasing price decision what benefit(s) you lost? ----------

**16.2. The product/hybrid maize seed selling price decision**

16.2.1 Who set your product (hybrid maize seed) price in 2010?

Myself =1 the contractor (ESE/ASE) =2 Negotiation between Me and the contractor/ESE/ASE=3 by the market=4 I don't know=5 other traders =6 (specify) --------

16.2.2 If you decided the selling price, how did you set the price?

Individually=1 collude consultation with other hybrid maize seed producers= 2 through their representative leaders=3 other=4 (specify) ----------

16.2.3 When did the selling price of hybrid maize seed set? Before production of the seed =1 after harvesting =2 during the time of selling=3 other=4 specify----

16.2.4 Based on the decision of your product price what benefit(s) you achieve? ----------

16.2.5 based on the decision of your product price what benefits(s) you lost----------16.2.6 Based on the time of your product price decision what benefit(s) you achieve? ----------16.2.7 Based on the time of your product price decision what benefit(s) you lost? ----------

**17. Hybrid maize seed farm size and location decision**

17.1 Who did decide your hybrid maize seed farm size during 2010?

Me=1 the contractor=2 Negotiation between Me and the contractor/ESE/ASE=3 determined the amount of inbred maize line seed =4 other traders =5 (specify) ----------17.2What was the merits/demerits of the decision? ----------17.3 How far your hybrid maize seed farm far from other maize farm? In meter

200-250=1 250-300=2 300-400=3 400-500=4 above 500=5

17.4 Based on the distance/clustering/, what was the advantage/disadvantage? ----------17.5 Do you have another alternative to adjust the distance without losing the quality of your hybrid maize seed? ----------

**17.6 Provide the information about the quantity and price of grain maize in the 2009/10**

Table 5

| N$^{o}$ | seed Type | Months of 2010 | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | | Feb | | Mar | | Apr | | May | | Jun | | July | | Aug | | Sep | | Oct | | Nov | | Dec | |
| 1 | Hybrid Maize | P | q | p | q | p | q | p | q | p | q | p | q | p | q | p | q | p | q | p | q | p | q | p | q |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

Where, P= price per quintal, and q= total quantity of maize sold in that specific month

**18. Additional Information on the household income**

**18.1. from crop production in general**

18.1.1 In the order of their importance, what were the major income sources in the 2010 production ear? Crop sales=1 livestock and its product sales=2 off-farm income=3 others=4 (specify) _____,----------,----------,----------,----------,

18.1.2 In the order of their importance, which crop did you sells most of the time? Maize=1 Wheat =2 Teff=3 Barley =4 others=5 (specify) _____, _____, _____

4- Other non-farm income,

18.1.3 Provide the income obtained from non-farm/off-farm activities and other income sources in the Production year of 2009/10

Table 6

| Types of off-farm & other sources income | income (birr) | Remark |
|---|---|---|
| Renting of animals (oxen, pack animals, etc) | | |
| Wage employment (by member of the household) | | |
| Sales of animal dung | | |
| Sales of fire wood/timber | | |
| Earnings from family member permanently hired to other household (eg herder) | | |
| Sale of drinking's and food items | | |
| Food aid (birr equivalent)/donation | | |
| Food for work ( birr equivalent) | | |
| Blacksmithing | | |
| Tannery | | |
| Weaving | | |
| Poetry | | |
| Small industries (grain mill, oil mill, etc) | | |
| Trade | | |
| Assistance from relative and friends | | |
| Gift | | |
| Remittance | | |
| Others (specify) | | |
| Total revenue | | |

## 18.2Cost of production and Marketing

18.2.1 How many man-days did you use in 2010 to produce the contracted hybrid maize seed plowing?

____man-days, Male----------, Female----------

18.2.2 What was the daily payment for laborers2010 in your area?

_____birr/day/man

18.2.3 How many man-days did you use in 2010 to plant the contracted hybrid maize seed plowing? ____man-days male----------, Female----------

18.2.4 How many man-days did you use in 2010 to weed the contracted hybrid maize seed plowing? ____man-days male----------, Female----------

18.2.5 How many man-days did you use in 2010 for fertilizer top dressing the contracted hybrid maize seed plowing? ____man-days male----------, Female----------

18.2.6 How many man-days did you use in 2010 for de-tasseling the contracted hybrid maize seed plowing? ____man-days male----------, Female----------

18.2.7 How many man-days did you use in 2010 for harvesting the contracted hybrid maize seed plowing? ____man-days male----------, Female----------

18.2.8 How many man-days did you use in 2010 for threshing the contracted hybrid maize seed plowing? ____man-days male----------, Female----------

18.2.7 How many days you plow your hybrid maize seed in 2010? ----------

What was the daily expense of a pair of ox in your area? ----------birr/day/one pair of ox

18.2.8 How many man-days did you use in 2010 to sell contracted hybrid maize seed produce? ____man-days

18.2.9 What was the daily payment for laborers? _____birr/day/man during 2010 in your area

18.2.10 **Provide the information related to the costs of labor and other in the marketing of hybrid maize seed produce**

Table7: **Cost of person-days Cost of animal labor Cost of vehicle**

| Activities | Cost of person-days | | | Cost of animal labor | | | Cost of vehicle transportation | | | Total cost (4+7+10) =11 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Person /days | unit cost | total cost (2*3)=4 | /days | unit cost | total cost (5*6)=7 | /days | unit cost | Total cost (8*9)=10 | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Transport to market | | | | | | | | | | |

**19. Nature of contractual agreement between the two parties**

**19.1 Service Delivery from your contractor**

**19.1.1 What was your agreement from your contractor to deliver services for you?**

Yes No

Table 8

| Nº | specifications | Yes | No |
|---|---|---|---|
| 1 | Access of inbred maize line seed adequately | | |
| 2 | Access of inbred maize line seed timely(before planting time) | | |
| 3 | Technical support timely and adequately | | |
| 3 | Supply of fertilizer timely and adequately | | |
| 4 | Transportation service for inputs and out puts | | |
| 5 | Credit service on time and at affordable price | | |
| 6 | Training service | | |
| 7 | Extension service | | |
| 8 | Market information service | | |
| 9 | Access of seed processing technologies | | |
| 10 | Quality standards | | |
| 11 | Pricing arrangements | | |
| 12 | Payment procedures | | |
| 13 | Insurance arrangements | | |
| 14 | Duration of contract | | |
| | Others(specify) | | |

19.1.2Which agreement(s) was/were accomplished on the agreement? Write the Nº

---

19.1.3 Which agreement(s) was/were not accomplished on the agreement? Write the Nº

---

19.1.4 If the agreements was/were not accomplished on the agreement, what was/were the main reason(s), specify ----------

19.1.5 To perform the agreement well what should do your contractor/sponsor in the future?

---

**19.2 What was your obligation to your contractor? In 2010 production year**

19.2.1 Formal and verbal specifications in contract farming (during 2010 production Season)

Yes /No

Table 9

| N$^{o}$ | specifications | Yes | No |
|---|---|---|---|
| 1 | Quantity of produce | | |
| 2 | Quality of produce | | |
| 3 | Delivery date | | |
| 4 | Amount of fertilizer used | | |
| 5 | Amount of pesticide used | | |
| 6 | Method of payments | | |
| 7 | Duration of contract | | |
| 8 | Quality standards | | |
| 9 | Pricing arrangements | | |
| 10 | Cultivation practices | | |
| 11 | Payment procedures | | |
| 12 | Other/specify | | |
| 13 | | | |
| 14 | | | |

19.2.2 From the above obligation which is/are accomplished based on the agreement? (Write the N$^{o}$) ----------

19.2.3 From the above obligation which is/are not accomplished based on the agreement? (Write the N$^{o}$) ----------

19.2.4 If the obligation was/were not accomplished based on the agreement, what was/were the main reason(s), specify ----------

19.2.5 To perform your obligation properly what do you suggest in the future? ----------

19.2.6 How do you rate the 2009/10 local hybrid maize seed contract farming agreement in terms of **contract complexity**? (Rate1-5), (circle)

1Strongly agree; 2: Agree; 3: No opinion; 4: Disagree; 5: Strongly disagree

19.2.7 How do you rate the 2009/10 local hybrid maize seed contract farming agreement in terms of **price of input (Price of inbred maize line seed)**? (Rate1-5), (circle) 1: Strongly agree; 2: Agree; 3: No opinion; 4: Disagree; 5: Strongly disagree

19.2.8 How do you rate the 2009/10 local hybrid maize seed contract farming agreement in terms of **price of your out put /hybrid maize seed**? (Rate1-5), (circle)

1: Strongly agree; 2: Agree; 3: No opinion; 4: Disagree; 5: Strongly disagree

19.2.9. How do you rate the 2009/10 local hybrid maize seed contract farming agreement in terms of **service quality**? (Rate1-5), (circle)

1: Strongly agree; 2: Agree; 3: No opinion; 4: Disagree; 5: Strongly disagree

19.10 How do you rate the 2009/10 local hybrid maize seed contract farming agreement in terms of **service adequacy?** (Rate1-5), (circle)

1: Strongly agree; 2: Agree; 3: No opinion; 4: Disagree; 5: Strongly disagree

19.11 How do you rate the 2009/10 local hybrid maize seed contract farming agreement in terms of **service cost?** (Rate1-5), (circle)

1: very cheap 2 cheap; 3: fair;4 expensive 5 very expensive

19.12 If your answer for question 19.2.6, 19.2.7, 19.2.8, 19.2.9, 19.2.10, 19.2.11 is 3, 4 or 5 what will be your recommendation/ suggestion to improve the existing contractual local hybrid maize seed production and marketing arrangement in order to enhance the benefits of local hybrid maize seed producer farmers?

1. Contract complexity?

---

1. In terms of price of input?

Inbred maize line seed----------

Fertilizer---------- ----

Herbicide/ pesticide----------

3. In terms of price of output/ hybrid maize seed? ----------

4. In terms of service quality? ----------

5. In terms of service adequacy? ----------6.

In terms of service cost----------

---

**20 Attitude towards the existing local hybrid maize seed contract farming Arrangement**

Score

Table 10

| **Nº** | **Items** | **Score** | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | Sponsors normally undertake to purchase all produce | | | | | |
| 2 | Contracts can provide respondents with access to managerial, technical and extension services | | | | | |
| 3 | Introduction to appropriate technology to upgrade agricultural commodities | | | | | |
| 4 | Gain access to markets | | | | | |
| 5 | The buyer/contractor buy the produce higher than the market price | | | | | |
| 6 | Improve quality of produce | | | | | |
| 7 | Stable income | | | | | |
| 8 | Reduce marketing risk | | | | | |
| 9 | Easy access to marketing information and extension services | | | | | |
| 10 | Gain access to loans or credit to finance production inputs | | | | | |
| 11 | Inputs and production services are supplied by the buyer/contractor | | | | | |
| 12 | Acquire knowledge for use on new crops | | | | | |
| 13 | Reliable supplies inputs | | | | | |
| 14 | Do not have to worry about marketing produce | | | | | |
| 15 | Guaranteed minimum prices | | | | | |
| 16 | Skill transfer such as record keeping | | | | | |
| 17 | The efficient use of farm resources | | | | | |
| 18 | Improved method of applying chemicals and fertilizers | | | | | |
| 19 | Contract farming can open up new markets | | | | | |
| 20 | Protect respondents from incurring losses in sales due downward price fluctuations | | | | | |
| 21 | Insurance arrangements for the failure of production due to lack of delivery of delivery of Reliable(foundation hybrid maize seed) | | | | | |
| 22 | Others(specify) | | | | | |
| 23 | | | | | | |
| 24 | | | | | | |

**Note:** 1: Strongly agree; 2: Agree; 3: No Opinion; 4: Disagree; 5: Strongly disagree

**21. Disadvantages of contract farming**

Yes/No

Table 11

| **Nº** | **Items** | **Yes** | **No** |
|---|---|---|---|
| 1 | Delay in payment | | |
| 2 | High requirement | | |
| 3 | Unhappy with the price | | |
| 4 | Lack of freedom on farm management and decision | | |
| | No freedom for buying input | | |
| | . No bargaining power, low price | | |
| | | | |
| | Other disadvantage(s)(specify | | |

**22. Reasons for conflicting**

Yes/ No

Table 12

| **Nº** | **Reasons** | **Yes** | **No** |
|---|---|---|---|
| 1 | Price terms | | |
| 2 | Quality terms | | |
| 3 | Quantity terms | | |
| 4 | Delivery time | | |
| 5 | Other reason(s)(specify) | | |
| | | | |

**23. What are the major constraints in the existing local hybrid maize seed production and marketing arrangement?**

1. Production constraints----------

2. Marketing constraints----------

3...Institutional constraints----------

4. Other constraint(s) Specify----------

**24. What are the major opportunities in the existing local hybrid maize seed production and marketing arrangement?**

1. Production opportunities----------

2. Marketing opportunities----------

3...Institutional opportunities----------

4. Other opportunity (ies) ----------

25. What do you recommend/suggest to overcome the existing constraints on local hybrid maize seed production and marketing arrangement?

1. Concerning production----------2. Concerning marketing----------3. Concerning institutions----------

26. What other alternative(s) do you recommend/suggest other than contract farming to achieve better benefits from local hybrid maize seed production and marketing?----------

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**27. Information on the woreda`s infrastructure**

187. Did you have access to the following infrastructure? All weather road=1 water source for drinking =2 Bus transport access=3 Market center in the woreda town=4
Veterinary clinic (for vaccines, medicines, & antibiotics) =5 artificial insemination service or bull service=6 Input supply shop=7 other =8 (specify) _____

**Thank you for your co-operation!**